

Comparative Effectiveness of Case Management for Adults with Medical Illness and Complex Care Needs

Appendixes

Appendix A. Definitions of Case Management

| Source | Definition |
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| Robert Wood Johnson Foundation, Research Synthesis Report No. 19 (12/2009) | Care management is a set of activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aim of improving patients' health status and reducing the need to medical services. The goals of care management are to improve patients' functional health status, enhance coordination of care, eliminate duplication of services, and reduce the need for expensive medical services. |
| Commission of Case Manager Certification (CCMC), 2004 | Case management is a collaborative process that assesses, plans, implements, coordinates, monitors, and evaluates options and services required to meet an individual's health needs, using communication and available resources to promote quality, cost-effective outcomes. |
| Case Management Society of America (CMSA), 2002 | Case management is a collaborative process of assessment, planning, facilitation, and advocacy for options and services to meet an individual's health needs through communication and available resources to promote quality cost-effective outcomes. |
| Case Management Leadership Coalition (CMLC), 2004 | Case managers work with people to get the health care and other community services they need, when they need them, and for the best value. |
| California Department of Health Services | <p>Guiding the course of resolution of a personal medical problem (including the 'problem' of the need for health education, screening or preventive services) so that the recipient is brought together with the most appropriate provider at the most appropriate times, in the most appropriate setting. The objectives of case management of Member medical care are as follows:</p> <ul style="list-style-type: none"> • To foster continuity of care and longitudinal Provider/Member relationships for Members in Santa Cruz and Monterey Counties. • To coordinate the care of members in order to achieve satisfactory care results. • To contribute to the reduction of the use of hospital emergency rooms as a source of non-emergency, first-contact and urgent medicine by Members. • To reduce unnecessary referral to specialty providers by Members. • To discourage medically inappropriate use of pharmacy and drug benefits by Members. • To facilitate Member understanding and use of disease prevention practices and early diagnostic services. • To provide a structure for Physicians to manage services to Members by means of the following: <ul style="list-style-type: none"> ○ Selection of Referral Physicians for quality of care, and adherence to the case management system and to cost effective delivery of services. ○ Measurement of individual and group Primary Care Physician performance on the basis of quality of care data. |
| AARP | Case management assigns the administration of care for an outpatient individual with a serious mental |

| Source | Definition |
|--|---|
| http://healthtools.aarp.org/galecontent/case-management | illness to a single person (or team); this includes coordinating all necessary medical and mental health care, along with associated supportive services. Case management tries to enhance access to care and improve the continuity and efficiency of services. Depending on the specific setting and locale, case managers are responsible for a variety of tasks, ranging from linking clients to services to actually providing intensive clinical or rehabilitative services themselves. Other core functions include outreach to engage clients in services, assessing individual needs, arranging requisite support services (such as housing, benefit programs, job training), monitoring medication and use of services, and advocating for client rights and entitlements. |
| Center for Medicare/Medicaid Services (CMS) http://www.cms.gov/SpecialNeedsPlans/Downloads/SPMeasuresUpdate.pdf | <p>Case management is the coordination of care and services provided to members to facilitate appropriate delivery of care and services. The organization implements case management for members. The goal of complex case management is to help members regain optimum health or improved functional capability, in the right setting and in a cost-effective manner. It involves comprehensive assessment of the member's condition; determination of available benefits and resources; and development and implementation of a case management plan with performance goals, monitoring and follow-up.</p> <p>Distinguishing features of case management</p> <ul style="list-style-type: none"> • Degree and complexity of illness or condition is typically severe • Level of management necessary is typically intensive • Amount of resources required for member to regain optimal health or improved functionality is typically extensive |
| American Nurses Association (ANA) http://www.nursingworld.org | Management directed toward serious conditions likely to require numerous providers and involve costly care. Case managers handle each case individually, identifying the most cost-effective treatments for extremely resource-intensive conditions, such as accidents, AIDS, cancer, major trauma, prematurity, and strokes. |

Appendix B. Exact Search Strings

Database: Ovid MEDLINE(R) and Ovid OLDMEDLINE(R)

1947 to August Week 3 2010

Search Strategy:

-
- 1 exp Case Management/ (6892)
 - 2 ((manag\$ or oversee\$ or supervis\$) adj3 (case or cases)).mp. [mp=title, original title, abstract, name of substance word, subject heading word, unique identifier] (19817)
 - 3 ((manag\$ or oversee\$ or supervis\$) adj5 (case or cases)).mp. (26663)
 - 4 exp Nurse Administrators/ (10083)
 - 5 3 and 4 (160)
 - 6 exp Nurses/ (61810)
 - 7 exp Nursing Care/ (107157)
 - 8 exp Nurse's Role/ (27024)
 - 9 nu.fs. (101286)
 - 10 6 or 7 or 8 or 9 (246543)
 - 11 3 and 10 (2003)
 - 12 exp "Outcome and Process Assessment (Health Care)"/ (507378)
 - 13 "Quality of Life"/ (84890)
 - 14 exp Attitude to Health/ (228011)
 - 15 11 and 12 (314)
 - 16 11 and 13 (69)
 - 17 11 and 14 (236)
 - 18 exp Mortality/ (225786)
 - 19 mo.fs. (333799)
 - 20 18 or 19 (460774)
 - 21 11 and 20 (27)
 - 22 exp Hospitalization/ or exp Hospitals/ (281082)
 - 23 exp Emergency Medical Services/ (74861)
 - 24 11 and 22 (342)
 - 25 11 and 23 (50)
 - 26 15 or 16 or 17 or 21 or 24 or 25 (753)
 - 27 exp disease attributes/ (683949)
 - 28 11 and 27 (211)
 - 29 26 or 28 (877)
 - 30 exp Physician-Patient Relations/ (51679)
 - 31 exp "Attitude of Health Personnel"/ (99409)
 - 32 11 and 30 (1)
 - 33 11 and 31 (437)
 - 34 29 or 32 or 33 (1083)
 - 35 3 and 12 (3626)
 - 36 1 and 12 (1313)
 - 37 1 and 13 (186)
 - 38 1 and 14 (827)
 - 39 1 and 20 (188)

40 1 and 22 (1303)
 41 1 and 23 (246)
 42 1 and 27 (669)
 43 1 and 30 (48)
 44 1 and 31 (551)
 45 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 (3614)
 46 limit 45 to english language (3440)
 47 exp Patient Care Planning/ (45271)
 48 3 and 47 (7634)
 49 1 or 48 (7634)
 50 48 not 1 (742)
 51 ((manag\$ or oversee\$ or supervis\$ or coordin\$) adj5 ((patient\$ adj3 (care or cares or caring)) or (case or cases))).mp. (32556)
 52 47 and 51 (8017)
 53 ((manag\$ or oversee\$ or supervis\$ or coordin\$) adj5 ((patient\$ adj3 care) or (case or cases))).mp. (32468)
 54 47 and 53 (8013)
 55 limit 54 to english language (7560)
 56 limit 55 to "all adult (19 plus years)" (2354)
 57 12 or 13 or 14 or 20 or 22 or 23 or 27 or 30 or 31 (2084401)
 58 56 and 57 (1368)
 59 56 not 58 (986)
 60 1 or 54 (8013)
 61 ((manag\$ or oversee\$ or oversight or supervis\$ or coordin\$) adj5 ((patient\$ adj3 care) or (case or cases))).mp. (32496)
 62 limit 56 to yr="2002 -Current" (1252)
 63 limit 56 to yr="1902-2001" (1102)

Database: EBM Reviews - Cochrane Central Register of Controlled Trials
<2nd Quarter 2010>
Search Strategy:

1 case manag\$.ti,hw,kw. (597)

Database: EBM Reviews - Cochrane Database of Systematic Reviews
<2005 to August 2010>
Search Strategy:

1 case manag\$.ti,kw. (9)
 2 case manag\$.oh,tw. (106)
 3 1 or 2 (106)

Database: EBM Reviews - Database of Abstracts of Reviews of Effects
<3rd Quarter 2010>
Search Strategy:

1 case manag\$.ti,kw,tw. (86)

Database: CINAHL
1937-December 15, 2011
Search Strategy:

S25 S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23 (2474)
S24 S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23
S23 S3 and S14
S22 S3 and S13
S21 S3 and S12
S20 S3 and S11
S19 S3 and S10
S18 S3 and S7
S17 S3 and S6
S16 S3 and S5
S15 S3 and S4
S14 (MH "Attitude of Health Personnel+")
S13 (MH "Professional-Patient Relations+")
S12 (MH "Disease Attributes+")
S11 (MH "Emergency Medical Services+")
S10 S8 or S9
S9 (MH "Hospitalization+")
S8 (MH "Hospitals+")
S7 (MH "Mortality+")
S6 (MH "Attitude to Health")
S5 (MH "Quality of Life")
S4 (MH "Outcome Assessment") OR (MH "Nursing Outcomes")
S3 S1 or S2
S2 (MH "Case Managers")
S1 (MH "Case Management")

Appendix C. Inclusion and Exclusion Criteria

Abstract level Eligibility Criteria

| <u>Study Characteristic</u> | <u>Inclusion/Exclusion</u> |
|-----------------------------|---|
| Population | Include: all ages >18; adults with medical illnesses and complex care needs Exclude: Mental health only |
| Interventions | Include: case management, care coordination, care management and disease management programs and others that may have elements of case management (e.g., coordination, medical monitoring) Exclude: disease management without care coordination, low intensity telephonic and short duration interventions, screening interventions |
| Comparators | Include: Usual care or other model of case management |
| Outcomes | Include: Relevant outcome measured (patient, resource utilization, or process measurement outcomes as listed in Key Questions. |
| Timing/Duration | Include: Duration >30 days |
| Setting | Include: Outpatient settings (i.e., primary care, specialty care, and home care) |
| Study Design | Include: RCT, cohort, case control, systematic review, meta-analysis |

Full Text Eligibility Criteria

| <u>Study Characteristic</u> | <u>Inclusion/Exclusion</u> |
|-----------------------------|--|
| Population | <p>Include: all ages >18; adults with medical illnesses and complex care needs</p> <p>Exclude: Mental health only</p> |
| Interventions | <p>Include: case management, care coordination, care management and disease management programs and others that may have elements of case management (e.g., coordination, medical monitoring)</p> <p>Exclude: disease management without care coordination, low intensity telephonic and short duration interventions, screening interventions</p> |
| Comparators | Include: Usual care or other model of case management |
| Outcomes | Include: Patient (health) outcomes, resource utilization (e.g., hospitalizations, primary care visits), or process measurement outcomes (e.g. medication adherence) |
| Timing/Duration | Include any study duration >30 days |
| Setting | <p>Include all outpatient settings (e.g., primary care)</p> <p>Exclude: Inpatient, hospital-based case management</p> |

Appendix D. Defining Complex Care Needs

| Source | Description/Definition |
|---|--|
| American Geriatrics Society | Persons whose conditions require complex continuous care and frequently require services from different practitioners in multiple settings. |
| Robert Wood Johnson Foundation, Research Synthesis Report NO. 19 (12/2009): Care management of patients with complex care needs | Usually patients who are Medicare beneficiaries with multiple chronic conditions, frequent hospitalizations, and limitations on their ability to perform basic daily functions due to physical, mental and psychosocial challenges. Patients with complex health care are patients at the far end of a population-wide spectrum ranging from health individuals to people with serious medical problems and high utilization of health care services. |
| Scottish Executive, Department of Health Ministries (Report 2007) | <p>Terms linked to the concepts of 'complex' and 'multiple' needs and include: 'multiple disadvantage', 'multiple disabilities', 'multiple impairment', 'dual diagnosis', 'high support needs', 'complex health needs', and 'multiple and complex needs.' People identified as having multiple and complex needs may include:</p> <ul style="list-style-type: none"> • People with mental health problems, including 'severe and lasting' problems • Those disadvantaged by age and transitions – young and older people • Those fleeing abuse and violence – mainly women and refugees • Those culturally and circumstantially disadvantaged or excluded – minority, ethnic groups; travelling people • People with a disability, including profound, severe or long term impairment or disability and those with sensory disabilities with 'additional needs' • People who present challenging behaviors to services, for example in schools, within residential services/ hostels or in their own neighborhoods • People who are multiply disadvantaged by poverty, poor housing, poor environments or rural locations which mean they are distant from services • People who have a 'dual diagnosis' of mental ill health and substance misuse, or of other combinations of medically defined conditions. • People who are 'marginal, high risk and hard to reach', who may be involved in substance misuse, offending and at risk of exclusion |

Appendix E. Quality Assessment Methods

Individual studies were rated as “good,” “fair” or “poor” as defined below(1):

Studies rated “good” have the least risk of bias and results are considered valid. Good quality studies include clear descriptions of the population, setting, interventions, and comparison groups; a valid method for allocation of patients to treatment; low dropout rates, and clear reporting of dropouts; appropriate means for preventing bias; appropriate measurement of outcomes, and reporting results.

Studies rated “fair” are susceptible to some bias, but it is not sufficient to invalidate the results. These studies do not meet all the criteria for a rating of good quality because they have some deficiencies, but no flaw is likely to cause major bias. The study may be missing information, making it difficult to assess limitations and potential problems. The “fair” quality category is broad, and studies with this rating vary in their strengths and weaknesses: the results of some fair-quality studies are *likely* to be valid, while others are only *probably* valid.

Studies rated “poor” have significant flaws that imply biases of various types that may invalidate the results. They have a serious or “fatal” flaw in design, analysis, or reporting; large amounts of missing information; or discrepancies in reporting. The results of these studies are at least as likely to reflect flaws in the study design as the true difference between the compared drugs.

For Controlled Trials:

Each criterion was given an assessment of yes, no, or unclear.

1. Was the assignment to the treatment groups really random?

Adequate approaches to sequence generation:

Computer-generated random numbers

Random numbers tables

Inferior approaches to sequence generation:

Use of alternation, case record numbers, birth dates or week days

Randomization reported, but method not stated

Not clear or not reported

Not randomized

2. Was the treatment allocation concealed?

Adequate approaches to concealment of randomization:

- Centralized or pharmacy-controlled randomization (randomization performed without knowledge of patient characteristics).

- Serially-numbered identical containers

- On-site computer based system with a randomization sequence that is not readable until allocation

- Sealed opaque envelopes

Inferior approaches to concealment of randomization:

- Use of alternation, case record numbers, birth dates or week days

- Open random numbers lists

- Serially numbered non- opaque envelopes

- Not clear or not reported

3. Were the groups similar at baseline in terms of prognostic factors?
4. Were the eligibility criteria specified?
5. Were outcome assessors and/or data analysts blinded to the treatment allocation?
6. Was the care provider blinded?
7. Was the patient kept unaware of the treatment received?
8. Did the article include an intention-to-treat analysis, or provide the data needed to calculate it (i.e., number assigned to each group, number of subjects who finished in each group, and their results)?
9. Did the study maintain comparable groups?
10. Did the article report attrition, crossovers, adherence, and contamination?
11. Is there important differential loss to followup or overall high loss to followup?

For Cohort Studies:

Each criterion was given an assessment of yes, no, or unclear.

1. Did the study attempt to enroll all (or a random sample of) patients meeting inclusion criteria, or a random sample (inception cohort)?
2. Were the groups comparable at baseline on key prognostic factors (e.g., by restriction or matching)?
3. Did the study use accurate methods for ascertaining exposures, potential confounders, and outcomes?
4. Were outcome assessors and/or data analysts blinded to treatment?
5. Did the article report attrition?
6. Did the study perform appropriate statistical analyses on potential confounders?
7. Is there important differential loss to followup or overall high loss to followup?
8. Were outcomes pre-specified and defined, and ascertained using accurate methods?

For Case-control Studies

Each criterion was given an assessment of yes, no, or unclear.

1. Did the study attempt to enroll all (or a random sample of) cases using pre-defined criteria?
2. Were the controls derived from the same population as the cases, and would they have been selected as cases if the outcome was present?
3. Were the groups comparable at baseline on key prognostic factors (e.g., by restriction or matching)?
4. Did the study report the proportion of cases and controls who met inclusion criteria that were analyzed?
5. Did the study use accurate methods for identifying outcomes?
6. Did the study use accurate methods for ascertaining exposures and potential confounders?
7. Did the study perform appropriate statistical analyses on potential confounders?

Appendix E Reference:

1. Harris RP, Helfand M, Woolf SH, Lohr KN, Mulrow CD, Teutsch SM, et al. Current methods of the US Preventive Services Task Force: a review of the process. *Am J Prev Med.* 2001 Apr;20(3 Suppl):21-35.

Appendix F. Excluded Studies

(Reasons for exclusion to be included in final report)

1. *Care coordination decreases hospitalizations: program combines face-to-face, telephonic CM*, in *Hospital Home Health*. p. 6-8.
2. *'Dually employed' case managers growing trend*, in *Hospital Case Management*. p. 172-173.
3. *Hospitals must reduce readmissions as CMS moves to cut reimbursement*, in *Hospital Case Management*. p. 129-139.
4. *Medical home model takes case management to the next level*, in *Case Management Advisor*. p. 108-110.
5. *Medicare project focuses on readmissions*, in *Healthcare Benchmarks & Quality Improvement*. p. 89-92.
6. *Providers reap big savings with case management*, in *Public Sector Contracting Report*. 1997. p. 145-51.
7. *'Down and dirty' medical information system identifies high-risk patients*, in *Data Strategies & Benchmarks*. 1998. p. 186-7.
8. *Carle Clinic's risk screening tools identify, help manage at-risk senior patients*, in *Public Sector Contracting Report*. 1998. p. 21-3.
9. *Case managers reorganize to challenge claims denials*, in *Hospital Case Management*. 1999. p. 133-6.
10. *Hospital group saves money with data on nurse case management*, in *Healthcare Benchmarks*. 2000. p. 97-100.
11. *Care management position statement*. American Geriatrics Society, in *Journal of the American Geriatrics Society*. 2000. p. 1338-9.
12. *Hospital group saves money with data on nurse case management: goal is benchmarking throughout continuum of care*, in *Healthcare Benchmarks*. 2000. p. 97-100.
13. *Summaries for patients. Effect of case managers on the care of patients with HIV infection*, in *Annals of Internal Medicine*. 2001. p. S-46.
14. *Reduce costs, improve outcomes with community case management*, in *Hospital Case Management*. 2001. p. 33-6.
15. *Proactive case management pays off for insurer in outcomes, cost savings: program achieves a minimum 4.5-to-1 return on investment*, in *Case Management Advisor*. 2003. p. 121-123.
16. *Proactive interventions cut hospitalization rate dramatically: program targets at-risk members*, in *Case Management Advisor*. 2003. p. 133-135.
17. *Case managers are still fighting to prove their value*, in *Hospital Case Management*. 2004. p. 1-4.
18. *Summaries for patients. Nurse care management for low-risk patients with heart failure*. [Original report in *Ann Intern Med*. 2004 Oct 19;141(8):606-13; PMID: 15492340], in *Annals of Internal Medicine*. 2004. p. 158.
19. *Program provides case management for ill, frail elderly who don't qualify for home care*, in *Senior Care Management*. 2004. p. 124-127.
20. *CMS programs tackle chronic care costs: home health agencies use CM experience...* Centers for Medicare & Medicaid Services, in *Case Management Advisor*. 2005. p. 41-43.
21. Abell, J., et al., *Case management for long-term conditions: developing targeting processes*, in *Care Management Journals*. p. 11-18.
22. Abissi, C.J., et al., *Cerebral infarction: comparison of a care plan with case-management to traditional care*, in *Neurology*. 1995.
23. Adam, R., *Delivering unique care: care co-ordination in practice*, in *Journal of Integrated Care*. 2006. p. 37-47.
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25. Alexopoulos, G.S., *Personalizing the care of geriatric depression*, in *American Journal of Psychiatry*. 2008. p. 790-2.
26. Aliotta, S., *Patient adherence outcome indicators: the Council for Case Management Accountability's first state of the science paper... first of a three-part series*, in *Case Manager*. 2002. p. 57-61.
27. Aliotta, S.L., *Focus on case management: linking outcomes and accountability*, in *Topics in Health Information Management*. 2000. p. 11-16.
28. Aliotta, S.L., et al., *Guided care: a new frontier for adults with chronic conditions*, in *Professional Case Management*. 2008. p. 151-8; quiz 159-60.
29. Aliotta, S.L., J.J. Vlasnik, and B. Delor, *Enhancing adherence to long-term medical therapy: a new approach to assessing and treating patients*, in *Advances in Therapy*. 2004. p. 214-31.
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37. Anderson-Loftin, W., *A nursing case management model for rural hospitals*, in *NursingConnections*. 1997. p. 27-38.
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40. Anon, [Public title] *A case management intervention for older patients with myocardial infarction; [Scientific title] A case management intervention for older patients with myocardial infarction: a randomised parallel-group single-centre trial*, in *ISRCTN Register [www.controlled trials.com]*. 2008.
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Appendix G. Quality Assessment of Trials and Observational Studies

Table G-1. Quality Assessment of Trials

| Author, year | Randomization adequate? | Allocation concealment adequate? | Groups similar at baseline (intervention and group)? | Eligibility criteria specified? | Outcome assessors masked? |
|--------------------------------|--------------------------------|---|---|--|----------------------------------|
| Babamoto, 2009 | Yes | No | Yes | Yes | Yes |
| Callahan, 2006 | No | No | Yes | Yes | Yes |
| Chien, 2008 | No | No | Yes | Yes | Yes |
| Chu 2000 | No | No | Yes | Yes | No |
| Clark 2004 | No | No | Unclear | Yes | No |
| DeBusk, 2004 | Yes | Yes | Yes | Yes | Yes |
| Dissemination (Medi-Cal), 2004 | Yes | Yes | Yes | Yes | No |
| Eloniemi-Sulkava, 2001 | Yes | Yes | Yes | Yes | Yes |
| Eloniemi-Sulkava, 2009 | Yes | Yes | Yes | Yes | No |
| Engelhardt, 2006 | Yes | No | Yes | Yes | Unclear |
| Gary, 2003 | Yes | Yes | No | Yes | Yes |
| Gary, 2004, 2005, 2009 | Yes | Yes | Yes | Yes | Yes |
| Goodwin, 2003 | No | No | Yes | Yes | Yes |
| Hsieh, 2007 | No | No | Yes | Yes | No |
| Husbands, 2007 | Yes | Yes | Yes | Yes | No |
| Jaarsma, 2008 | Yes | No | Yes | Yes | Yes |
| Jansen, 2011 | Yes | Yes | Yes | Yes | Yes |
| Krein, 2004 | Yes | No | Yes | Yes | Yes |
| Laramée, 2003 | No | No | No | Yes | No |
| McCorkle, 1989 | No | No | No | Yes | Unclear |
| McCoy, 1992 | No | No | No | Yes | No |
| Mittelman, 2008 | Yes | Yes | Yes | Yes | Yes |
| Mittleman, 2006 | Yes | Yes | Yes | Yes | No |
| Moore, 2002 | No | Yes | Yes | Yes | Unclear |
| Mor, 1995 | No | No | Yes | Yes | Unclear |
| Newcomer, 1999 MADDE | No | No | Yes | Yes | No |
| Nickel, 1996 | No | No | Yes | Yes | No |
| Nyamathi, 2006; | No | No | No | Yes | No |
| Peikes, 2009 | Yes | Yes | Yes | Yes | Unclear |
| Peters-Klimm, 2010 | Yes | Yes | Yes | Yes | No |
| Rich, 1993 | Yes | Yes | No | Yes | No |
| Rich, 1995 | No | No | No | Yes | No |
| Riegel, 2002 | No | No | Yes | Yes | Unclear |
| Riegel, 2006 | No | No | No | Yes | No |
| Ritz, 2000 | No | No | No | Yes | Unclear |

| Author, year | Randomization adequate? | Allocation concealment adequate? | Groups similar at baseline (intervention and group)? | Eligibility criteria specified? | Outcome assessors masked? |
|------------------------|--------------------------------|---|---|--|----------------------------------|
| Shea, 2002, 2006, 2006 | Yes | No | Yes | Yes | Yes |
| Sisk, 2006 | Yes | Yes | Yes | Yes | Yes |
| Sorensen, 2003 | No | No | Yes | Yes | Yes |
| Vickrey 2006 | Yes | Yes | Yes | Yes | Yes |
| Wohl, 2006 | Yes | Yes | Yes | Yes | Yes |
| Wolf, 2004, 2007 | Yes | Unclear | Yes | Yes | NR |

| Author, year | Reporting of attrition, crossovers, adherence, and contamination? | Dropout rate <20 percent | Intention-to-treat analysis? | Appropriate Statistical Analyses | Quality rating | Funding |
|--------------------------------|--|------------------------------------|-------------------------------------|---|-----------------------|--|
| Babamoto, 2009 | Yes, No, No, No | No | No | Yes | Fair | Pfizer foundation and Pfizer health solutions |
| Callahan, 2006 | Yes, No, No, No | Yes | Yes | Yes | Good | AHRQ |
| Chien, 2008 | No, No, No, No | No | Yes | Yes | Poor | Nethersole School of Nursing, Hong Kong |
| Chu 2000 | No, No, No, No | Yes | Yes | Yes | Poor | Funded by home care agency |
| Clark 2004 | Yes, No, No, No | No | No | Yes | Poor | Private foundations |
| DeBusk, 2004 | Yes, No, No, No | Yes | Yes | Yes | Good | NIH |
| Dissemination (Medi-Cal), 2004 | Yes, No, No, No | Yes | Yes | Yes | Fair | State of California Medi-Cal managed care division and CDC. |
| Eloniemi-Sulkava, 2001 | No, No, No, No | Yes | Yes | Yes | Good | Social Insurance Institution, Finland, and the Alzheimer Foundation of Finland |
| Eloniemi-Sulkava, 2009 | No, No, No, No | Yes | Yes | Yes | Good | Research grants received from Finnish Slot Machine Association. |
| Engelhardt, 2006 | Yes, Yes, No, No | No | Yes | Yes | Fair | Foundations (RWJF, Fox/Samuels, Cummings) |
| Gary, 2003 | Yes, No, Yes, No | Yes | No | Yes | Fair | NIH |
| Gary, 2004, 2005, 2009 | Yes, No, Yes, No | Yes | No | Yes | Fair | NIH, Hopkins General Clinical Research Center |
| Goodwin, 2003 | Yes, No, No, No | Yes | Yes | Yes | Fair | Not reported |
| Hsieh, 2007 | No, No, No, No | Yes | Yes | Yes | Fair | Not reported |
| Husbands, 2007 | No, No, No, No | No | No | Yes | Poor | Wellesley Central Health Corp and the CLEAR Unit (Canada) |
| Jaarsma, 2008 | Yes, Yes, Yes, No | Yes | Yes | Yes | Good | Netherlands Heart Foundation |
| Jansen, 2011 | Yes, No, Yes, Yes | Yes | Yes | Yes | Good | Netherlands Organization for Health Research and Development |
| Krein, 2004 | Yes, No, Yes, No | Yes | No | Yes | Fair | VA |
| Laramée, 2003 | Yes, No, No, No | Yes | Unclear | Yes | Fair | Novartis |
| McCorkle, 1989 | Yes, No, No, No | No | Unclear | Yes | Poor | Grant: NU-01001, HRSA |
| McCoy, 1992 | No, No, No, No | No | No | Yes | Poor | HRSA |
| Mittelman, 2008 | Yes, No, Yes, No | Yes | Yes | Yes | Good | Pfizer; NYU Alzheimer's Disease Center; |

| Author, year | Reporting of attrition, crossovers, adherence, and contamination? | Dropout rate <20 percent | Intention-to-treat analysis? | Appropriate Statistical Analyses | Quality rating | Funding |
|------------------------|--|---------------------------------------|-------------------------------------|---|-----------------------|---|
| Mittleman, 2006 | Yes, Yes, Yes, Yes | Yes | Yes | Yes | Good | Not Reported |
| Moore, 2002 | Yes, No, No, No | No | Yes | Yes | Fair | NHS, National Cancer Program |
| Mor, 1995 | Yes, No, Yes, No | Yes (at 3 months) No (at 6 months) | Yes | Yes | Fair | Not reported |
| Newcomer, 1999 MADDE | No, No, No, No | Unclear | No | Yes | Poor | |
| Nickel, 1996 | No, No, No, Yes | No | No | Yes | Poor | NIH, National Institute for Nursing Research |
| Nyamathi, 2006; | Yes, No, Yes, No | Yes | Yes | Yes | Fair | National Institute on Drug Abuse |
| Peikes 2009 | Yes, No, No, No | Yes | Yes | Yes | Good | Medicare |
| Peters-Klimm, 2010 | Yes, No, Yes, No | Yes | Yes | Yes | Good | German Ministry of Education and Research |
| Rich, 1993 | Yes, No, No, No | Yes | Yes | Yes | Poor | American Heart Association |
| Rich, 1995 | Yes, No, No, No | Yes | Yes | Yes | Fair | NIH |
| Riegel, 2002 | Yes, No, No, No | Yes | Unclear | Yes | Fair | Pfizer |
| Riegel, 2006 | Yes, No, No, No | Yes | No | Yes | Fair | AHA |
| Ritz., 2000 | Yes, No, No, No | Yes (at 1 year) No (at 2 years) | Unclear | Yes | Poor | Not reported |
| Shea, 2002, 2006, 2006 | Yes, No, No, No | Yes | Yes | Yes | Fair | Supported by Cooperative Agreement 95-C-90998 from the Centers for Medicare and Medicaid Services. |
| Sisk, 2006 | Yes, No, No, No | Yes | Yes | Yes | Good | AHRQ |
| Sorensen, 2003 | Yes, No, No, No | Yes | No | Yes | Fair | NIH/NIDA grants |
| Vickrey 2006 | Yes, Yes, Yes, No | No | Yes | Yes | Good | |
| Wohl, 2006 | Yes, Yes, Yes, Yes | No | Yes | Yes | Fair | Centers for Disease Control and Prevention, and UARP |
| Wolf, 2004, 2007 | Yes, No, Yes, No | No | Yes | Yes | Good | American Dietetic Association, National Institute of Diabetes & Digestive & Kidney Diseases & University of Virginia General Clinical Research Center |

Table G-2. Quality Assessment of Observational Studies

| Author, Year | Did the study attempt to enroll all (or a random sample of) patients meeting inclusion criteria, or a random sample (inception cohort)? | Were the groups comparable at baseline on key prognostic factors (e.g., by restriction or matching)? | Did the study use accurate methods for ascertaining exposures, potential confounders, and outcomes? | Were outcome assessors and/or data analysts blinded to treatment? | Did the article report attrition? | Did the study perform appropriate statistical analyses on potential confounders? | Is there important differential loss to follow-up or overall high loss to followup? | Were outcomes pre-specified and defined, and ascertained using accurate methods? | Quality rating |
|---------------------|--|---|--|--|--|---|--|---|-----------------------|
| Andersen, 2007 | Unclear | Yes | Yes | No | No | No | Yes | Yes | Poor |
| Curtis, 2009 | Unclear | No | Yes | Unclear | No (N/A) | Yes | No | Yes | Fair |
| Dorr, 2005 | Yes | Yes (CM/control) No (Registry) | Yes | No | No (N/A) | Yes | No | Yes | Good |
| Kushel, 2006 | Yes | Unclear | Yes | No | Yes | Yes | No | Yes | Good |
| Lehrman, 2001 | Yes | NA | Yes | No | No | No | Unclear | Yes | Poor |
| Lin, 2006 | Yes | Unclear | Yes | No | Yes | No | No | Yes | Poor |
| Mangura, 2002 | Yes | No | Yes | No | Yes | Yes | No | Yes | Good |
| Wilson, 2005 | No | Yes | Yes | Unclear | No | Yes | No | Yes | Fair |

Appendix H. Evidence Tables: Case Management for Older Adults with Multiple Chronic Diseases

| Author, Year (Quality Score) | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross- over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES (Socioeconomic) |
|--|--|---|--|--|--|
| Boult 2011 Good Boyd, 2009 Wolff, 2010 | To measure the effect of guided care teams on multimorbid older patients' use of health services. | ≥65 years or older and at high risk of using health services heavily during the following year, as estimated by the claims based hierarchical condition category (HCC) predictive model in the highest quartile. | NR | Cluster RCT, 20 months | Mean age: 77.5 years Age range: 66-106 55% Female 51% White 55% reported have inadequate finances |
| Lim et al., 2003 Good | To evaluate the benefits of coordinating community services through the Post-Acute Care (PAC) program in older patients after discharge from the hospital at 4 city hospitals in Victoria, Canada. | Age ≥ 65 years; discharged between 8/1998 and 10/1999; in an acute ward > 48 hours; expected to live ≥ 1 month post-discharge and met the following risk criteria: likely to have mobility or self-management problems, lived alone, had responsibilities for caring for others at home, used community services before hospital admission, and required community services on discharge. | Admitted from or discharged to a nursing home; discharged from an emergency department; obstetric or psychiatric patients. | RCT, 6-months | Age: 77 yearsGender: 59% femaleRace: NRHS diploma: 69% (highest education) |
| Martin 2004 Good Disease management but included CM component. | To examine the effect of population- based disease management and case management on resource use, self-reported health status, and member satisfaction within an HMO, Medicare Plus Choice. Implemented the Senior Life Management Program. | ≥65 years, signed consent on their health plan enrollment form to participate, and continuously enrolled with the health plan for all of 1999. | NR | RCT of case management and population-based disease management, 18 months Note: 38.5% (1640 patients) evaluate for CM. | Mean age: 73 years53% FemaleRace: NR |
| Newcomer et al., 2004 Good | To report the effectiveness of a program intended to complement the primary care of high-risk geriatric patients using nurse case managers. <i>Hypothesis was that those in ECM would have lower utilization and expenditures and higher health status than those in usual care.</i> | Active PacifiCare member as of 1/1/2000; age ≥ 80 years or age ≥ 65 with at least one qualifying condition (i.e., COPD, CHF, coronary disease, diabetes) and receiving care from a Sharp Health Care clinic. | Living in nursing home, Alzheimer's facility, or hospice; end-stage renal diseases; histories of organ transplants at the time of baseline data collection; using VA or other military-connected health care benefits. | RCT, 12 monthsArticle reports of the Elders in Managed Care Program of one site. | Age: 70% ≥ 80 yearsGender: 60% femaleRace: 88% WhiteEducation: 23% more than H.S.Income: 70% ≤ \$20,000/year |

| | | | | | |
|---|---|---|---|--|--|
| Peikes et al, 2009 (a) Site: Carle - Integrated Delivery System Good | Medicare Care Coordination Demonstration (MCCD)- comparison of 15 programs describing to determine whether care coordination programs improved quality of care for chronically ill Eligible-fee-for-service Medicare beneficiaries and reduced hospitalizations/ expenditures | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program. | End-stage renal disease , long-term nursing home, unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.), excluded patients with ESRD. | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 86% ≥ 65 yearsGender: 47.5% maleRace: 3.7% Black/Non-HispanicMedicaid: 5.3%Education: 14% less than H.S. |
| Peikes et al, 2009 (b) Site: CorSolutions - Provider of disease Care/Coordinated Care/QI services | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease Long-term nursinghomeCX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 72.8% ≥ 65 yearsGender: 38.1% maleRace: 30.5% Black/Non-HispanicMedicaid: 27.9% Education: 36.3% less than H.S. |
| Peikes et al, 2009 c) Site: Washington University - Academic Medical Center | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 63.5% ≥ 65 yearsGender: 45.3% maleRace: 36.8% Black/Non-HispanicMedicaid:19.1 % Education: 25.3% less than H.S. |
| Peikes et al, 2009 (d) Site: Avera - Community Hospital | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | Age < 65 yearsEnd-stage renal disease Long-term nursinghomeSM: unable to learn self management (serious mental illness or dementiaCX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 80% ≥ 65 yearsGender:52 % maleRace: 0.1% Black/Non-HispanicMedicaid:8.2 % Education: 34% less than H.S. |
| Peikes et al, 2009 (e) Site: CenVaNet - Provider of disease Care/Coordinated Care/QI services | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | Age < 65 yearsEnd-stage renal disease SM: unable to learn self management (serious mental illness or dementiaCX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 87% ≥ 65 yearsGender: 56.5% maleRace: 14.9% Black/Non-HispanicMedicaid: 8.2% Education: 34% less than H.S. |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross- over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES (Socioeconomic) |
|--|---|---|--|---|---|
| Peikes et al, 2009 (f) Site: Charlestown - Retirement Community | See above | Medicare beneficiaries (primarily > 65 years old) covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease Long-term nursing home CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 56.5% ≥ 65 years Gender: 34.5% male Race: 0.5% Black/Non-Hispanic Medicaid: 0% Education: 10.2% less than H.S. |
| Peikes et al, 2009 (g) Site: Health Quality Partners - Provider of disease Care/Coordinated Care/QI services | See above | Medicare beneficiaries (primarily > 65 years old) covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | Age < 65 years End-stage renal disease Long-term nursing home SM: unable to learn self management (serious mental illness or dementia) CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 93% ≥ 65 years Gender: 39.7% male Race: 0.8% Black/Non-Hispanic Medicaid: 1.8% Education: 1.6% less than H.S. |
| Peikes et al, 2009 (h) Site: Medical Care Development - Community Hospital | See above | Medicare beneficiaries (primarily > 65 years old) covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease SM: unable to learn self management (serious mental illness or dementia) CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 82.4% ≥ 65 years Gender: 50.6% male Race: 0% Black/Non-Hispanic Medicaid: 20.7% Education: 32% less than H.S. |
| Peikes et al, 2009 (i) Site: Mercy Medical Center - Community Hospital | See above | Medicare beneficiaries (primarily > 65 years old) covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease Long-term nursing home CX: Unusually complex (HIV virus/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 78.6% ≥ 65 years Gender: 54.6% male Race: 0.1% Black/Non-Hispanic Medicaid: 11.6% Education: 29.7% less than H.S. |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross- over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES (Socioeconomic) |
|--|---|--|--|---|---|
| Peikes et al, 2009 (j) Site: Qmed - Provider of disease Care/Coordinat ed Care/QI services | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 86.5% ≥ 65 yearsGender: 44.5% maleRace: 5.1% Black/Non-HispanicMedicaid:13.7 % Education: 19.7% less than H.S. |
| Peikes et al, 2009 (j) Site: Georgetown - Academic Medical Center | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease Long-term nursing home CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 82.6% ≥ 65 yearsGender: 44.8% maleRace: 63% Black/Non-HispanicMedicaid: 21.3% Education: n/a |
| Peikes et al, 2009 (k) Site: Quality Oncology - Provider of disease Care/Coordinat ed Care/QI services | See above | Medicare beneficiaries (primarily > 65 years old)covered by FFS/traditional Medicare and had one or more of the chronic conditions targeted by the program | End-stage renal disease Long-term nursing home CX: Unusually complex (HIV/AIDS, transplant recipient or candidate, or terminally ill.) | RCT - coordinated care program treatment vs. usual care, 3 years | Age: 80.1% ≥ 65 yearsGender: 45.5% maleRace: 8.5% Black/Non-Hispanic Medicaid:13.7 % Education: n/a |

| Author, Year (Quality Score) | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Co-existing mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. |
|--|---|---|--|---|
| Boult 2011 Good Boyd, 2009 Wolff, 2010 | 81% Hypertension; 19% CHF; 21% COPD, asthma or emphysema; 49% diabetes; 27% cancer (not skin) | 42% self-reported fair/poor health, 4.3 average of chronic conditions | 18% receiving Medicare, Kaiser, TRICARE/US Family Health Plan (USFHP) | Yes, Kaiser of the Mid-Atlantic states, Johns Hopkins Community Physicians (JHCP) and Med Star Physician Partners |
| Lim et al., 2003Good | Patients eligible for PAC, received intervention because of recent hospitalizations1) NR, Mean # of co-morbidities, 2.32) NR | See previous cell (post-hospitalization and at least 2 co-morbidities) | Victoria, Canada Health Care System | See previous cell |
| Martin 2004 Good Disease management but included CM component. | Medicare beneficiaries ≥65 years1) NR2) NR | NR | Medicare | Medicare Choice Plus, HMO |
| Newcomer et al., 2004 Good | High-risk elderly 1) Coronary Artery Disease: 66%Diabetes: 25% 2) Depression: 7% | # of chronic conditions: a) at least 2 =7%b) 3 or more =2% | PacifiCare | Yes, PacifiCare |
| Peikes et al, 2009 (a) (Note, all Peikes Good) Site: Carle - Integrated Delivery System | CAD 45.5%CHF 27.7%Diabetes 28.5% COPD 21.1%Cancer 20.8%Stroke 13.5% 1) Depression 13.1% 2) Dementia 5.1% | Rural locationHospitalization within the year before random assignment for target diagnosis or other diagnosisMedicaid (proxy for poverty): 5% | Medicare | No (fee for service) (4/15)Yes, (not specified) |
| Peikes et al, 2009 (b) Site: CorSolutions - Provider of disease Care/Coordinated Care/QI services | CAD 83.5%CHF 96.4%Diabetes 55% COPD 49.8%Cancer 16.9%Stroke 40.1% 1) Dementia 12.3% 2) Depression 21.9% | Hospitalization within the year before random assignment for target diagnosis or other diagnosis Medicaid (proxy for poverty): 28% | Medicare | No |
| Peikes et al, 2009 c) Site: Washington University - Academic Medical Center | CAD 54.8%CHF 41.5%Diabetes 42.2% COPD 31.4%Cancer 35.9%Stroke 23.7% 1) Dementia 11.5% 2) Depression 23.4% | Hospitalization within the year before random assignment for target diagnosis or other diagnosisMedicaid (proxy for poverty):19% | Medicare | No |
| Peikes et al, 2009 (d) Site: Avera - Community Hospital | CAD 75.4%CHF 96.7%Diabetes 40% COPD 42.5%Cancer 23.7%Stroke 21.1% 1) Dementia 4% 2) Depression 14.5% | Rural locationMedicaid (proxy for poverty): 8% | Medicare | No |

| | | | | |
|--|---|---|----------|----|
| Peikes et al, 2009 (e) Site: CenVaNet - Provider of disease Care/Coordinated Care/QI services | CAD 73.4%CHF 47.8%Diabetes 50.7% COPD 27.9%Cancer 27.7%Stroke 26.4% 1) Dementia 4.8% 2) Depression 10.9% | Medicaid (proxy for poverty): 5% | Medicare | No |
| Peikes et al, 2009 (f) Site: Charlestown - Retirement Community | CAD 54.9%CHF 43.4%Diabetes 25.1% COPD 36.4%Cancer 32.3%Stroke 32% 1) Dementia 8.4%2) Depression 18.7% | Medicaid (proxy for poverty): 0% | Medicare | No |
| Peikes et al, 2009 (g) Site: Health Quality Partners - Provider of disease Care/Coordinated Care/QI services | CAD 34%CHF 10.6%Diabetes 24.3% COPD 12.8%Cancer 22.2%Stroke 14.2% 1) Dementia 1.8% 2) Depression 8.3% | Hospitalization within the year before random assignment for target diagnosis or other diagnosis Medicaid (proxy for poverty): 2% rural location | Medicare | No |
| Peikes et al, 2009 (h) Site: Medical Care Development - Community Hospital | CAD 78.3%CHF 48.5%Diabetes 41.6% COPD 31.8%Cancer 19%Stroke 17.3% 1) Dementia 2.3% 2) Depression 16.9% | Medicaid (proxy for poverty): 21% | Medicare | No |
| Peikes et al, 2009 (i) Site: Mercy Medical Center - Community Hospital | CAD 64.1%CHF 60.1%Diabetes 33.3% COPD 52.9%Cancer 23.6%Stroke 26.1% 1) Dementia 6.3% 2) Depression 24.2% | Hospitalization within the year before random assignment for target diagnosis or other diagnosis Rural location Medicaid (proxy for poverty): 12% | Medicare | No |
| Peikes et al, 2009 (j) Site: Qmed - Provider of disease Care/Coordinated Care/QI services | CAD 48.6%CHF 18.1%Diabetes 25.5% COPD 14.3%Cancer 19.8%Stroke 14% 1) Dementia 1.6% 2) Depression 9.5% | Hospitalization within the year before random assignment for target diagnosis or other diagnosis Medicaid (proxy for poverty): 14% | Medicare | No |
| Peikes et al, 2009 (j) Site: Georgetown - Academic Medical Center | CAD 80.9%CHF 96.1%Diabetes 54.8% COPD 40%Cancer 23.9%Stroke 28.3% 1) Dementia 12.2% 2) Depression 14.3% | Hospitalization within the year before random assignment for target diagnosis or other diagnosis Medicaid (proxy for poverty): 21% | Medicare | No |
| Peikes et al, 2009 (k) Site: Quality Oncology - Provider of disease Care/Coordinated Care/QI services | CAD 46% CHF 18% Diabetes 25.1% COPD 32.2% Cancer 94.3% Stroke 14.2% 1) Dementia 5.7% 2) Depression 10.9% | Medicaid (proxy for poverty): 14% | Medicare | No |

| Author, Year (Quality Score) | Characteristics of the case manager: | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload |
|---|---|---|--|---|--|-------------------------------|
| Boult 2011 Good Boyd, 2009 Wolff, 2010 | RNs who completed a course in guided care nursing. | Guided care nurse working in partnership with patients' primary care physicians provided the following: comprehensive assessment, evidence- based care planning, monthly monitoring of symptoms and adherence, transitional care, coordination of health care professionals, support for self management, support for family caregivers, and enhanced access to community services. | Yes, completed course in guided care nursing. | Primary care clinic | Visits and phone | 50 to 60 patients |
| Lim et al., 2003 Good | CM in this study was a PAC coordinator and was hospital- based staff with allied health or nursing backgrounds. | PAC coordinator help to develop a discharge plan services provided included: 1) telephone follow-up as required; 2) available to patients in the event of a crisis; 3) acted as liaison with service providers (e.g., nursing agencies); coordination of services and 4) ensured adequate referral before discharge. | NR | Hospital (post- discharge) | Visits and phone | NR |
| Martin 2004 Good Disease management but included CM component. | Nurse care coordinator, no other details | A nurse care coordinator (NCC) was responsible for outbound contact to those in complex case managementcommunicating with treating physicians and staff, following up on hospitalizations and ER visits, and arranging for home health care and equipment through the PCP. Overall, program included creation of a CM electronic record, comprehensive, health status assessments, telephonic CM, patient education materials and coordination with community services. | NR | Clinic, phone | NR | 50 to 70 patients per team |

| | | | | | | |
|--|---|--|--|--|--|--|
| Newcomer et al., 2004 Good | 6 NCMs, 2 per medical group monitored for quality through review and consultation with peers. | CM intervention included, health risk screening and a care plan, assessment, monitoring status of the patient and implementing care plan (including care plan goals), support for caregivers, treatment of adherence monitoring and careful attention of CM during times of transition (e.g., hospital to home). Initial assessment included a home visit if necessary. CM also determined if patients were of high, medium, or low risk. Depending on patient needs and risk, patients were given an active or monitoring status. | NR | Sharp Health Care Clinic | Telephone. Average contact hours with CM were 7.7 per year for each patient. | 250 patients with 60 actively managed at any one time. |
| Peikes et al, 2009 (a) (Note, all Peikes Good) Site: Carle - Integrated Delivery System | Care coordinator - Registered Nurse | Intervention goals collectively: (1) improving adherence to treatment recommendations through patient education (2) improving communication and coordination, including identifying worsening symptoms before they required hospital care (3) improving physician practice (4) increasing access to support. Services programs educating patients to improve adherence to medication, diet, exercise and self-care regimens standardized curricula and evaluation of educational effectiveness via monitoring clinical indicators, assessing patient knowledge and self-reported behavior, and having patients repeat/ explain information back to coordinator. Focus on increasing physician adherence to evidence-based or guide-line based care | Three-week orientation; directed observation by supervisor | Integrated home delivery system, (multiple primary care and specialty clinics) | Telephone | 1:155 |
| Peikes et al, 2009 (b) Site: CorSolutions - Provider of disease Care/Coordinated Care/QI services | Care coordinator - Registered Nurse | See above | Three-week orientation | Commercial disease management company, care coordination service centers | Telephone | 1:145 |
| Peikes et al, 2009 c) Site: Washington University - Academic Medical Center | Care coordinator - Registered Nurse | See above | Two-day orientation | Academic medical center | Telephone | 1:50 for local 1:100 for telephone |

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|---|--|---|--|--|----------------------------------|------|
| Peikes et al, 2009 (d) Site: Avera - Community Hospital | Care coordinator - Registered Nurse | See above | Orientation by supervisor | Community hospital | Telephone | 1:88 |
| Peikes et al, 2009 (e) Site: CenVaNet - Provider of disease Care/Coordinated Care/QI services | Care coordinator - Registered Nurse | See above | Two-week orientation; directed observation by supervisor | Commercial disease management company, care coordination service centers | Telephone | 1:70 |
| Peikes et al, 2009 (f) Site: Charlestown - Retirement Community | Care coordinator - Registered Nurse | See above | Orientation by supervisor; worked with experienced mentor | Retirement community | Telephone | 1:60 |
| Peikes et al, 2009 (g) Site: Health Quality Partners - Provider of disease Care/Coordinated Care/QI services | Care coordinator - Registered Nurse | See above | Orientation; role-playing; supervisor mentors | Commercial disease management company, care coordination service centers | Telephone | 1:90 |
| Peikes et al, 2009 (h) Site: Medical Care Development - Community Hospital | Care coordinator - Registered Nurse | programs educating patients to improve adherence to medication, diet, exercise and self-care regimens standardized curricula and evaluation of educational effectiveness via monitoring clinical indicators, assessing patient knowledge and self-reported behavior, and having patients repeat/explain information back to coordinator | Orientation; worked with experienced mentor | Community hospital | Telephone | 1:70 |
| Peikes et al, 2009 (i) Site: Mercy Medical Center - Community Hospital | Care coordinator - Registered Nurse w/ BSN | programs educating patients to improve adherence to medication, diet, exercise and self-care regimens standardized curricula and evaluation of educational effectiveness via monitoring clinical indicators, assessing patient knowledge and self-reported behavior, and having patients repeat/explain information back to coordinator | Four-week orientation | Community hospital | Primary: In Person+ Telephone | 1:50 |

| | | | | | | |
|---|---|---|--|--|-----------|-------|
| Peikes et al, 2009 (j) Site: Qmed - Provider of disease Care/Coordinated Care/QI services | Care coordinator - Licensed Practical Nurse | programs educating patients to improve adherence to medication, diet, exercise and self-care regimensstandardized curricula and evaluation of educational effectiveness via monitoring clinical indicators, assessing patient knowledge and self-reported behavior, and having patients repeat/explain information back to coordinator | Orientation | Care coordination service centers | Telephone | 1:200 |
| Peikes et al, 2009 (j) Site: Georgetown - Academic Medical Center | Care coordinator - Registered Nurse w/ BSN | programs educating patients to improve adherence to medication, diet, exercise and self-care regimensstandardized curricula and evaluation of educational effectiveness via monitoring clinical indicators, assessing patient knowledge and self-reported behavior, and having patients repeat/explain information back to coordinator | Worked withexperienced mentorfor 6 to 8 months | Academic medical center | Telephone | 1:36 |
| Peikes et al, 2009 (k) Site: Quality Oncology - Provider of disease Care/Coordinated Care/QI services | Care coordinator - Registered Nurse | programs educating patients to improve adherence to medication, diet, exercise and self-care regimens Standardized curricula and evaluation of educational effectiveness via monitoring clinical indicators, assessing patient knowledge and self-reported behavior, and having patients repeat/explain information back to coordinator. | Two-week orientation; close oversight by supervisor for 6 months | Commercial disease management company, care coordination service centers | Telephone | 1:40 |

| Author, Year (Quality Score) | Frequency of visits and phone calls | Face: Face Time (Location) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment |
|--|--|---|---|--|---|---|--|
| Boult 2011 Good Boyd, 2009 Wolff, 2010 | NR | NR | Yes | NR | NR | Yes | Yes, monitored medications but did not adjust. |
| Lim et al., 2003 Good | NR | NR | Discharge planning and other services | NR | NR | Yes, acted as liaison for services and provided referrals as part of discharge planning. | Presumably no to monitoring and did not adjust. |
| Martin 2004 Good Disease management but included CM component. | NR | NR | Yes, included comprehensive, periodic health assessments. | Yes, provided patient education materials (no other details provided). | NR | Yes, coordinated with PCP and arranged home health care. | NR for monitoring. For adjustment no, but IT system did monitor use of certain medications known to be contraindicated for use in the elderly. When filling one of these prescriptions, generated an alert to prescribing physician asking to reconsider/ check order. |
| Newcomer et al., 2004 Good | If active status, patients contacted via phone at least monthly and more likely weekly. For monitoring status, patients were contacted every 60-90 days. | During clinic visits, average=25 minutes per visit. | A care plan was developed to address needs and problems of the patients and set attainable goals. | Yes, CM provided education materials on chronic illnesses, advice and discussed high risk behaviors with patients. | Presumably yes, but NR. | Yes, as needed, patients and family members give appropriate referrals (e.g., physical therapy), training in navigating the health plan and help with benefits/coverage, as well as community based programs and support groups. Also, CM coordinated with PCP through letters and phone calls when needed (See Notes). | Unclear, but stated this: CM . . . "had no direct role in chronic disease treatment management (such as periodic monitoring of weight gain or laboratory values)." No adjustment. |

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|--|--|------------------------------|---|---|--|--|--|
| Peikes et al, 2009 (a) (Note, all Peikes Good)Site: Carle - Integrated Delivery System | Weekly to quarterly by telephone; in person as necessary | No, primarily telephone | Comprehensive patient assessment: review of medical and health service use history, current health, medications, health habits, functional status, and finances | Nurses educated patients to improve medication, diet, exercise, & self-care regimen adherence; materials part of electronic databases | Patient education based on behavioral change model | Assessed patients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certain equipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Did monitor medications. Program coordinators called physicians to suggest medication adjustments. |
| Peikes et al, 2009 (b) Site: CorSolutions - Provider of disease Care/Coordinated Care/QI services | Every 2 weeks for first few months; monthly thereafter | In-person patient assessment | Same as above | Same as above | Same as above | No coordination of additional services | Same as above. |
| Peikes et al, 2009 (c) Site: Washington University - Academic Medical Center | At least every 6 weeks | In-person patient assessment | Same as above | Same as above | Same as above | Assessed patients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certain equipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (d) Site: Avera - Community Hospital | Weekly for first 6 months; twice monthly thereafter | In-person patient assessment | Same as above | Same as above | Same as above | Assessed patients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certain equipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (e) Site: CenVaNet - Provider of disease Care/Coordinated Care/QI services | At least monthly by telephone; at least every 6 months in person | In-person patient assessment | Same as above | Same as above | Same as above | Assessed patients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certain equipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |

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|---|--|---|---------------|---------------|---------------|---|----------------|
| Peikes et al, 2009 (f) Site: Charlestown - Retirement Community | Daily to monthly | No, primarily telephone | Same as above | Same as above | Same as above | Assessedpatients' needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certainequipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (g) Site: Health Quality Partners - Provider of disease Care/Coordinated Care/QI services | At least monthly | No, primarily telephone, in person at home assessment for high risk patients only | Same as above | Same as above | Same as above | Assessedpatients' needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certainequipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (h) Site: Medical Care Development - Community Hospital | Three or four timesduring first month;monthly thereafter | In-person patient assessment | Same as above | Same as above | Same as above | Assessedpatients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certainequipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (i) Site: Mercy Medical Center - Community Hospital | At least monthly | In-person patient assessment | Same as above | Same as above | Same as above | Assessedpatients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certainequipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |

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|--|-------------------|------------------------------|---------------|---------------|---------------|--|----------------|
| Peikes et al, 2009 (j) Site: Qmed - Provider of disease Care/Coordinated Care/QI services | Every other month | No, primarily telephone | Same as above | Same as above | Same as above | Assessedpatients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certainequipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (j) Site: Georgetown - Academic Medical Center | At least monthly | In-person patient assessment | Same as above | Same as above | Same as above | Assessedpatients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certainequipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |
| Peikes et al, 2009 (k) Site: Quality Oncology - Provider of disease Care/Coordinated Care/QI services | Weekly to monthly | No, primarily telephone | Same as above | Same as above | Same as above | Assessed patients needs for non-Medicare support services or additional Medicare-covered services (home care; transportation; certain equipment and supplies; and disease-specific, diet, or smoking-cessation support groups) | Same as above. |

| Author, Year (Quality Score) | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes |
|---|--------------------------------|-------------------------|---|---|---|---|
| Boult 2011 Good Boyd, 2009 Wolff, 2010 | Yes | No | Usual care group continued to receive care from their established primary care physicians. | Measured at 18 months, overall satisfaction with healthcare was higher for GC patients (p=0.002) and caregivers (adjusted beta=0.40, 95% CI=0.14-0.67) than UC | Adjusted GC:UC Ratio of Service Use (95% CI) in all study groups; patients at very high risk (HCC \geq 1.6); Kaiser patients Hospital Admissions: 1.01 (0.83-1.23); 1.00 (0.78-1.28); 0.85 (0.61-1.19) 30-day Readmission: 0.79 (0.53-1.16); 0.81 (0.53-1.26); 0.51 (0.23-1.15) Hospital days: 1.00 (0.77-1.30); 0.88 (0.64-1.22); 0.79 (0.53-1.19) SNF admissions: 0.92 (0.60-1.40); 0.90 (0.52-1.54); 0.53 (0.31-0.89) SNF days: 0.84 (0.48-1.47); 0.83 (0.39-1.76); 0.48 (0.28-0.84) ED visits: 1.04 (0.81-1.34); 1.18 (0.84-1.66); 0.83 (0.56-1.21) Primary care visits: 1.02 (0.91-1.14); 0.98 (0.84-1.14); 1.08 (0.90-1.29) Special visits: 1.07 (0.93-1.23); 1.09 (0.91-1.30); 0.93 (0.75-1.15) HHC episodes: 0.70 (0.53-0.93) ; 0.84 (0.60-1.23); 1.09 (0.69-1.74) | Measured at 18 months, GC patients had twice greater odds of rating their care coordination highly (aOR=1.80, 95% CI=1.12-2.90, p=0.01) and their caregivers rated quality of care coordination significantly higher (adjusted beta=0.47, 95% CI=0.14-0.81) |
| Lim et al., 2003 Good | Presumably no | No | Usual care included discharge planning, provided by ward nursing staff and the social work department. Services limited to several nursing visits per week and community services (e.g., delivered meals and housekeeping support). | 1 months after baseline visit, PAC group had greater improvements in independent living (P=0.002) and overall quality-of-life scores (P=0.02) compared to control. No difference in caregiver stress in PAC vs. control groups at 1 month post baseline. <i>Note: did not measure QOL at 6 month.</i> | <u>Hospital</u> PAC vs. Control (Mean, 95% CI) a) Unplanned admissions: 0.4 (0.3–0.5) vs. 0.5 (0.4–0.6); p=0.19 b) Emergency visits: 0.1 (0.0–0.1) vs. 0.1 (0.0–0.1); p=0.95 c) Hospital days used 3.0 (2.1–3.9) vs. 5.2 (3.8–6.7); p<0.01 Patients with unplanned admissions: 75 (25%) vs. 79 (28%); p=0.25 Patients with emergency visits: 19 (6%) vs. 11 (4%); p=0.18 <u>Community</u> Meals on Wheels: 1030 (18%) vs. 1831 (33%); p< 0.001 Nursing: 3300 (58%) vs. 2882 (52%); p< 0.001 Home care: 623 (11%) vs. 605 (12%); p=0.73 Personal care: 540 (10%) vs. 136 (3%); p< 0.001 | NR |

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| Martin 2004 Good Disease management but included CM component. | Yes | Intervention included "Master Console," an electronic health care management system that delivered info to case management staff. Alerted team to clinical status of patient and any changes that may require case management . | No specifics regarding usual care. | Intervention vs. Control1) Number of deaths: 191 vs. 21; p=.18Change in Intervention vs. Control2) SF-36 Health Domainsa) General: -1.5 vs. -2.3; p=.09b) Mental: -.013 vs. 0.01; p=.74c) Physical fracture: -4.3 vs. 4.0; p=.67d) Social: -1.4 vs. -2.8; p=.043 Change in satisfaction with healthcare plan: 0.32 vs. 0.12; p<0.01 | Intervention vs. Control1) Inpatient admissions (1000/pt/year): 430 vs. 421; p=.892) Inpatient bed-days (1000/pt/year): 1929 vs. 1989; p=.463) SNF admissions (1000/pt/year): 36 vs. 37; p=.734) SNF bed-days: 616 vs. 748; p=.025) Mean cost/member: 6828 vs. 7001; p=.61 | |
| Newcomer et al., 2004 Good | Yes, at the same clinic and CM communicated with PCP. | No | Usual care provided by PacifiCare but depended on hospital, ER, etc. | Mean values at baseline; 12 monthsSF- 12 Mental:CM: 52.4; 51.9Control: 52.4; 52.3SF-12 Functional:CM: 38.9; 38.7Control: 38.3; 38.4 | Mean values at baseline; 12 monthsMonthly days in hospital: CM: .9; 1.0 vs. Control: 1.2; 1.3% 1 or more nursing home admissionCM: 7.9; 6.8 vs. Control: 11.9: 12.6 | NR |
| Peikes et al, 2009 (a) (Note, all Peikes Good)Site: Carle - Integrated Delivery System | Yes, program administrators worked with physicians | Yes, Carle Care Management Information System | Control groups received "usual care," that did not include care coordinators | NR | Adjusted Annualized Hospital admissions:CM-control dif., (90%CI); % difference0.022 (-0.026 to 0.070) 4.2, p=.45Adjusted Medicare expenditures: (\$) Total CM-control dif., (90%CI); % difference209 (153 to 265) 30.1 p< .001 | (Treatment % vs. Control %; difference)Being taught to follow a healthy diet:71.5 vs. 45.6; 24.9 Colon cancer screening: 42.9 vs. 42.1; .08Mammography:74.8 vs. 71.2; 3.6Eye examination:86.5 vs. 83.3; 3.2Hemoglobin A1C testing: 94.9 vs. 94.7; .02Urine microalbuminuria testing: 81.0 vs. 60.2; 20.8 |

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|---|---|--|---------------|----|--|--|
| Peikes et al, 2009 (b) Site: CorSolutions - Provider of disease Care/Coordinated Care/QI services | No | CorSolutions CorConnect | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference-0.057 (-0.174 to 0.059) -3.2 p=.42Adjusted Medicare expenditures:(\$) TotalTX-control dif., (90%CI); % difference213 (25 to 400) 8.2 p=.06 | Being taught to follow a healthy diet:75.1 vs. 64.8; 10.3Colon cancer screening: 36.4 vs. 41.3; -4.9Mammography:32.6 vs. 34.1; -1.5Eye examination:75.8 vs. 73.2; 2.6Hemoglobin A1C testing: 82.7 vs. 77.9; 4.8Urine microalbuminuria testing:25.5 vs. 22.7; 3.1 |
| Peikes et al, 2009 c) Site: Washington University - Academic Medical Center | Yes, program administrators worked with physicians | Status One CareLink case management software | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % differenceAdjusted Medicare expenditures:(\$) TotalTX-control dif., (90%CI); % difference245 (96 to 395) 12.9 p=.007 | Being taught to follow a healthy diet:59.9 vs. 53.7; 6.2Colon cancer screening: 49.3 vs. 47.0; 2.4Mammography:56.4 vs. 57.3; -0.9Eye examination:85.2 vs.87.3; -2.1Hemoglobin A1C testing: 86.1 vs. 86.0; .01Urine microalbuminuria testing:27.9 vs. 31.4; -3.5 |
| Peikes et al, 2009 (d) Site: Avera - Community Hospital | Yes, some physicians employed by host; worked with staff. | Microsoft Access database | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference-0.025 (-0.199 to 0.150) -1.8 p=.82Adjusted Medicare expenditures:(\$) TotalTX-control dif., (90%CI); % difference236 (65 to 408) 17.0 p=.02 | Being taught to follow a healthy diet:70.5 vs. 55.6; 14.9Colon cancer screening: 36.9 vs. 37.2; -0.3Mammography:44.3 vs. 43.7; .06Eye examination:87.4 vs. 85.6; 1.2Hemoglobin A1C testing: 82.0 vs. 80.8; 1.2Urine microalbuminuria testing:19.8 vs. 27.8; -8.0 |

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| Peikes et al, 2009 (e) Site: CenVaNet - Provider of disease Care/Coordinated Care/QI services | Yes, physicians part of host network | Informa Care commercial disease management software | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference0.039 (-0.038 to 0.116) 5.9 p=.41Adjusted Medicare expenditures:(\$) TotalTX-control dif., (90%CI); % difference111 (22 to 200) 13.0 p= .04 | Being taught to follow a healthy diet:75.5 vs. 41.2; 33.4Colon cancer screening: 41.8 vs. 41.5; 0.3Mammography:46.4 vs. 47.5; -1.1Eye examination:90.4 vs. 89.0; 1.4Hemoglobin A1C testing: 88.1 vs. 88.3;- .02Urine microalbuminuria testing:833.4 vs. 27.1; 6.3 |
| Peikes et al, 2009 (f) Site: Charlestown - Retirement Community | Yes, program administrators & care coordinators worked with physicians | Canopy commercial web-based case management software | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference0.118 (0.025 to 0.210) 19.0 p=.04Adjusted Medicare expenditures: (\$) TotalTX-control dif., (90%CI); % difference405 (267 to 542) 40.6 p< .001 | Being taught to follow a healthy diet:46.3 vs. 24.4; 21.8Colon cancer screening: 45.4 vs. 42.8; - .05Mammography:62.0 vs. 49.6; 12.4Eye examination:96.5 vs. 89.4; 7.1Hemoglobin A1C testing: 81.9 vs. 78.7; 3.2Urine microalbuminuria testing:9.9 vs. 3.4; 6.5 |
| Peikes et al, 2009 (g) Site: Health Quality Partners - Provider of disease Care/Coordinated Care/QI services | Yes, program administrators worked with physicians | Microsoft Access database | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference-0.049 (-0.111 to 0.012) -11.4 p= .19Adjusted Medicare expenditures:(\$) TotalTX-control dif., (90%CI); % difference19 (-68 to 107) 2.8 p=.72 | Being taught to follow a healthy diet:84.5 vs. 32.8; 52.0 Colon cancer screening: 42.8 vs. 36.6; 6.2Mammography:77.1 vs. 72.22; 4.9Eye examination:87.8 vs. 92.0; -4.2Hemoglobin A1C testing: 97.5vs. 92.8; 4.7Urine microalbuminuria testing:95.6 vs. 93.0; 2.6 |

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|---|--|--|---------------|----|--|---|
| Peikes et al, 2009 (h) Site: Medical Care Development - Community Hospital | Yes, physicians employed by hospitals participating in the program | Clinical Management Systems commercial disease management software | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference-0.050 (-0.207 to 0.107) -3.4 p=.60Adjusted Medicare expenditures:(\$)TX-control dif., (90%CI); % difference 28 (-153 to 209) 1.7p= .80 | Being taught to follow a healthy diet:85.3 vs. 71.0; 12.5 Colon cancer screening: 48.8 vs. 49.6; .08Mammography:50.4 vs. 48.5; 1.9Eye examination:86.5 vs. 83.3; 3.2Hemoglobin A1C testing: 86.6vs. 89.9; 1.4Urine microalbuminuria testing:38.2 vs. 37.8; 0.4 |
| Peikes et al, 2009 (i) Site: Mercy Medical Center - Community Hospital | Yes, program staff worked with physicians | Mercy Case Management Information System | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference-0.168 (-0.283 to -0.054) -17.1 p= .02Adjusted Medicare expenditures:(\$)TX-control dif., (90%CI); % difference134 (15 to 252) 11.1 p= .07 | Being taught to follow a healthy diet:66.4 vs. 45.5; 20.9 Colon cancer screening: 35.2 vs. 36.7; -1.5Mammography:47.9 vs. 44.7; -1.9Eye examination:97.8 vs. 97.0; 0.8Hemoglobin A1C testing: 87.7 vs. 86.1; 1.6Urine microalbuminuria testing:38.2 vs. 37.8; 0.4 |
| Peikes et al, 2009 (j) Site: Qmed - Provider of disease Care/Coordinated Care/QI services | Yes, "many" program staff worked with physicians | QMeds OHMS,PIMS , and PAT | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference0.006 (-0.047 to 0.059) 1.4 p=.86Adjusted Medicare expenditures:(\$) TotalTX-control dif., (90%CI); % difference | Being taught to follow a healthy diet:44.3 vs. 29.9; 13.5 Colon cancer screening: 43.8 vs. 43.8; -0.1 [sic]Mammography:66.6 vs. 68.5; -1.9Eye examination:88.4 vs. 86.8;1.6Hemoglobin A1C testing: 90.5 vs. 90.1; .04Urine microalbuminuria testing:47.5 vs. 49.5; -2.0 |

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|---|--|---|---------------|----|---|---|
| Peikes et al, 2009 (j) Site: Georgetown - Academic Medical Center | Some physicians employed by host | Canopy commercial web- based case management software | same as above | NR | Adjusted Annualized Hospital admissions:TX-control dif., (90%CI); % difference-0.494 (-0.919 to -0.069) -24.0 p=.07Adjusted Medicare expenditures:(\$ TotalTX-control dif., (90%CI); % difference | Being taught to follow a healthy diet:N/AColon cancer screening: N/AMammography:37.2 vs. 20.8; 16.4Eye examination:81.7 vs. 79.2; 2.5Hemoglobin A1C testing: 78.8 vs. 77.5; 1.3Urine microalbuminuria testing:31.1 vs. 19.8; 11.3 |
| Peikes et al, 2009 (k) Site: Quality Oncology - Provider of disease Care/Coordinated Care/QI services | Yes, "many" program staff worked with physicians | Quality Oncology Integrated Care Management System | same as above | NR | Adjusted Annualized Hospital admissions: TX-control dif., (90%CI); % difference 0.049 (-0.366 to 0.463) 4.4 p= .85 Adjusted Medicare expenditures:(\$ Total TX-control dif., (90%CI); % difference 67 (-26 to 160) 9.0 p=.24 | NR |

| Author, Year (Quality Score) | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Notes |
|---|---|--|--|--|
| Boult 2011 Good Boyd, 2009 Wolff, 2010 | NR | 13534/2391/904 | 54/0/850 | |
| Lim et al., 2003 Good | NR | NR/946/654 (randomized)598 received intervention | 8/25/598 | Control group assessments reassessed by mail and through phone calls. |
| Martin 2004 Good Disease management but included CM component. | NR | 13,304/NR/8504 | 1467/0/6158 | Case management component of intervention was part of a larger disease management program, Senior Life Management (SLM). Did not report results of case management subgroup. |
| Newcomer et al., 2004 Good | None | 5859/NR/3079 | NR/3079 | Also includes data of reasons for the likelihood of service use but this does but overall (not comparing CM vs. control).CM monitored physician use and clinic appointments and contacted those who repeatedly missed appointments (or if PCP requested contact). CM intervened by calling to remind members, facilitate transportation, or coordinated with caregivers to also attend patient visits. |
| Peikes et al, 2009 (a) (Note, all Peikes Good) Site: Carle - Integrated Delivery System | Pt. self report of adverse medical events collected, but specific harms related to Case management, NR | Entire Study Total: 18 309 patients (n=178to 2657 per program)Individual sites:Enrolled After 12and 24 Months:2,2832,642 | Analyzed (Overall) Treatme nt(n = 9427)Control(n = 8975)Treatment only: 10% | |
| Peikes et al, 2009 (b) Site: CorSolutions - Provider of disease Care/Coordinated Care/QI services | same as above | Enrolled After 12and 24 Months:6712,162 | 43% | |
| Peikes et al, 2009 c) Site: Washington University - Academic Medical Center | same as above | Enrolled After 12and 24 Months:1,4252,038 | 15% | |
| Peikes et al, 2009 (d) Site: Avera - Community Hospital | same as above | Enrolled After 12and 24 Months:318624 | 28% | |
| Peikes et al, 2009 (e) Site: CenVaNet - Provider of disease Care/Coordinated Care/QI services | same as above | Enrolled After 12and 24 Months:1,0741,305 | 16% | |

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| Peikes et al, 2009 (f) Site: Charlestown - Retirement Community | same as above | Enrolled After 12and 24 Months:430802 | 11% | |
| Peikes et al, 2009 (g) Site: Health Quality Partners - Provider of disease Care/Coordinated Care/QI services | same as above | Enrolled After 12and 24 Months:4981,140 | 2.50% | *Difference between the treatment and control groups significantly different from 0 at the 0.10 level, 2-tailed test. |
| Peikes et al, 2009 (h) Site: Medical Care Development - Community Hospital | same as above | Enrolled After 12and 24 Months:393876 | 38% | |
| Peikes et al, 2009 (i) Site: Mercy Medical Center - Community Hospital | same as above | Enrolled After 12and 24 Months:627865 | 13% | |
| Peikes et al, 2009 (j) Site: Qmed - Provider of disease Care/Coordinated Care/QI services | same as above | Enrolled After 12and 24 Months:1,4041,454 | 12.50% | |
| Peikes et al, 2009 (j) Site: Georgetown - Academic Medical Center | same as above | Enrolled After 12and 24 Months:108199 | 26% | |
| Peikes et al, 2009 (k) Site: Quality Oncology - Provider of disease Care/Coordinated Care/QI services | same as above | Enrolled After 12 and 24 Months: 63 141 | 45% | |

Appendix I. Evidence Tables: Case Management for the Frail Elderly

| Author, Year (Quality Score) | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES |
|--|---|---|--|--|--|
| Bernabei 1998 | To evaluate the impact of a program of integrated social and medical care among frail elderly people living in the community. | People aged 65 and over who were recipients of home health services or home assistance programs. | NR | "Random allocation to an intervention group receiving integrated social and medical care and case management or to a control group receiving conventional care." Duration: 1 year | Mean age: 80 years Women: 70% Race NR |
| Gagnon et al., 1999 Schein, 2005 | To compare the effects of nurse case management with usual care provided to community-dwelling frail older in regard to QOL, satisfaction with care, functional status, hospital admissions, length of hospital stay, and readmission to ER department. <i>Research question: are there differences in QOL, satisfaction with care, functional status, admission to hospital, length of hospital stay, or readmission to ED, for community-dwelling older people identified as being at risk of health decline who receive either NCM or usual care?</i> | Age \geq 70 years; discharged home from the hospital ED; living in vicinity of community health centers of Montreal; able to speak English or French; passed the abbreviated Mini-Mental Health State Exam; require assistance with at least one activity of daily living (ADL) or 2 instrumental activities of daily living (IADL); had a probability of 40% or more of admission to hospital as defined by the Boulton assessment tool. | Admission to the ED from a long-term care facility or nursing home; participation in other research studies; currently followed by the geriatric team of the hospital; unavailable for \geq 2 months during the period of the study; having a partner already participating; and hospitalization at the time of contact. | RCT, 10 months | Age: 81 years Gender: 59% female Race: NR |
| Leung et al., 2004 | To evaluate the effectiveness of case management provided to a group of home dwelling, frail elderly patients. | Hospital-discharged; age \geq 60 years; \geq 2 or more chronic medical illnesses, and a recent history of repeat hospitalizations (2 or more episodes in past 6 months). | NR | RCT, 6 months | Mean age= 76 years (+/- 6 years) Gender: 53% female Race: NR |

| Author, Year (Quality Score) | Study Purpose AND/OR <i>A priori hypothesis (if stated)</i> | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES |
|---------------------------------------|---|--|---|--|--|
| Long 1999, Marshall 2000 | <p>This demonstration project of an ambulatory CM program in Ohio goal was to eliminate fragmented care, inappropriate utilization, unnecessary cost, and confusion among Kaiser members for older members with chronic diseases.</p> <p><i>Hypothesized health and function status and satisfaction with care would improve in CM group. Expected more outpatient visits (less costly) and fewer hospitalizations, ER use.</i></p> | Age \geq 75 years; severe functional disability; excessive hospital use or emergency department use | NR | RCT, 24 months (Assessments taken at 0, 6, 12, 24 months). | <p>Mean Age: 82 years Gender: 64% female Race: NR Education: 65% did not complete 12th grade</p> |
| Rubenstein, 2007 | To test whether a system of screening, assessment, referral, and follow-up provided within primary care for high-risk older outpatients improves recognition of geriatric conditions and healthcare outcomes. | <p>Patients \geq 65 years old receiving care at 2 practice groups Sepulveda Ambulatory Care Center (SACC) of the VA Greater Los Angeles Healthcare System who had at least one clinic visit at SACC in the previous 18 months. Patients identified by Geriatric Postal Screening Survey (GPSS) and scored >4.</p> | Living outside a 30-mile radius of SACC, already enrolled in outpatient geriatric services at SACC, or living in a long-term care facility. | RCT, 12 months with followup interviews at 2 and 3 years | <p>Mean Age: 74 years3% FemaleRace: NR76% \geq high school degree</p> |

| Author, Year (Quality Score) | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Co-existing mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience |
|---|---|---|--|--|--|
| Bernabei 1998 | Frail elderly 1) NR 2) Mean value of geriatric depression score=10.6 | Mean number of medical conditions=4.8; Mean number of medications=4.4 per patient | Health agency of Rovereto, Italy | NA | CM trained in comprehensive geriatric assessment and case management, Geriatric Evaluation Unit and GP. |
| Gagnon et al., 1999 Schein, 2005 | Frail elderly >70 years of age and at risk for repeated hospital admissions discharged home from the emergency department. 1) Diabetes: 22% Cardiac disease: 54% Self-reported health: 25% poor; 44% fair; 2) NR | 65% had a hospitalization within the previous 12 months; 65% >6 visits with physician 61% living alone though 73% reported a caregiver is available (see previous cell). | Montreal, Canada Health System | See previous cell | 4 nurses with a minimum of 2 years of geriatric nursing experience and worked full-time as NCMs for the study. |
| Leung et al., 2004 | Frail elderly, two or more chronic medical illnesses. 1) 51% Hypertension; 12% HF; 32% with diabetes; 28% with COPD 2) NR | All | Hong Kong Health Care System | NA | 4 CM trained in nursing elderly patients. |
| Long 1999, Marshall 2000 | Poor functional status, high utilizations of ER and/or hospital. 1) Mean ADL: 6.5 Mean IADL: 5.7 2) NR (though measured poor function status) | NR | Kaiser | Yes, Kaiser of Northern Ohio | 2 CMs from both nursing and social work with prior geriatric CM experience. |
| Rubenstein, 2007 | Target conditions: falls/balance problems, urinary incontinence, depression, memory loss, and functional impairment. 1) Average co-morbid conditions=2.32) 47% with a >5 on geriatric depression score (range 0-15) | Unmet needs for geriatric services | VA Greater LA Healthcare System | Yes, VA | Physician assistant (PA) with geriatric expertise. |

| Author, Year | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) |
|-------------------------------------|--|--|---|---|---|---|---|
| Bernabei 1998 | Case management and care planning by the community geriatric evaluation unit and general practitioners. 2 case managers conducted assessment visits every 2 months, available to deal with problems and to monitor services. | CMs received training in comprehensive geriatric assessment and case management. | Clinic | Assessment visits at least every two months and as needed. | No more than 20 subjects per case manager. | NR | NR |
| Gagnon et al., 1999 Schein, 2005 | Patients in NCM group given a card with CM beeper number, CM available by beeper 8am-8pm Monday-Friday. CM provided integrated care including support patients and caregivers during times of transitions (e.g., hospital to home), and changes in resource needs. The CM coordinated the work of all healthcare providers and implemented a responsive plan of care. <i>CM met weekly with research team members to ensure uniformity in care.</i> | 24 hours (3 days) of initial training which included an introduction to role of CMs, resources available, and study expectations. Each NCM developed a guide to community services available to clients. Skills validated by conducting full geriatric assessments of selected patients. | University hospital and two community health centers, patients home, phone follow-up. | Home visits and calls, averaged 3.6 home visits per patient and 2.8 calls per month for each patient. | 40-55 patients per CM with an average of 46 patients/CM | 3.6 home visits per month for each patient and 2.8 calls per month for each patient. (36 home visits and 28 telephone calls per patient) | NR |
| Leung et al., 2004 | Scope of intervention included, regular monitoring health status to provide preventive proactively; available for via phone 8am-9pm; home visits, if needed; prescribing of community-based supportive services (including community nursing services). Included access a case geriatrician by the CM for medical support which included telephone consultation, assessment of subjects in the outpatient department, and admission of subjects to the hospital. | NR | Unclear but hospital and via phone. | Phone | 4 for 47 subjects (~10 per CM) | NR | NR |

| Author, Year (Quality Score) | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) |
|-------------------------------------|--|---|---|--|--|--|--|
| Long 1999, Marshall 2000 | CM protocols were developed (in consultation with geriatrician) by the study team and defined scope of work for CM and adapted as needed. Initial visit of CM was a home visit to explain the study (and obtain consent), and conduct an initial 2-4 hour assessment visit. After initial visit, CM developed a care plan and for complicated cases, CM care plan was reviewed by interdisciplinary team. | NR | Depended on location of patient, home, hospital nursing home visits, home visits, family conferences and telephone. | Presumably home visits and phone. | 2 CM acting as a team for 140 in CM group. | NR | Initial assessment visit was 2-4 hours. |
| Rubenstein, 2007 | 1) Initial assessment over the phone to identify specific risks and unmet needs and CM made specific referrals and recommendations and referrals for services accordingly. If needed, CM conducted this at the geriatric assessment clinic. Based on information collected, patients were given referrals and recommendations. 2) Participants referred to the geriatric clinic received a PE, geriatric assessment (evaluation of physical health, functional status, mental health). Also, a geriatric psychiatrist was available to evaluate patients with dementia or depression. 3) CM participants were discussed with team and a care plan was developed. 4) CM followed up with patients who a 1-month after initial and afterwards, every 3 months via phone. | NR | Follow-up calls 1-month after initial CM contact and subsequent calls every 3 months. | NR | | | |

| Author, Year | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) |
|-------------------------------------|---|--|--------------------------------|--|--|--|--------------------------------|
| Bernabei 1998 | Initial assessment included the following: physical function, daily living, cognitive function and mood and the geriatric depression scale as well as providing a complete list of diagnoses and drug treatments. Subsequent visits were every 2 months and more if needed. Also recorded the number of home visits by GPs. | NR | NR | CM provided coordination and initiation of services (with initial assessment visit) for participants. | NR | Yes, CM was part of an interdisciplinary team which included a GP and geriatric evaluation unit. | NR |
| Gagnon et al., 1999 Schein, 2005 | Yes, initiated a responsive plan of care. | NR | Not explicit. | Yes, CM developed a list of community resources to give to patients. | NR | Yes | No |
| Leung et al., 2004 | Yes, included in intervention. | NR | NR | Provided community-based supportive services. | Yes, as part of the intervention, monitored medication but did not adjust. | Not clear if CM and team geriatrician reported to GP. | NR |
| Long 1999, Marshall 2000 | Care plan was developed after initial visit and for complex cases reviewed by interdisciplinary team for approval. | NR | NR | Yes, scheduled medical appointments, accompanied participants to appointments and met with staff to coordinate care across sites (e.g., hospital, clinic). Arranged nonmedical services such as respite care, meals on wheels, nursing home placement, Medicaid eligibility and transportation to doctor's visits. | NR but presumably CM discussed this with PCP and did not adjust. | Yes | No |
| Rubenstein, 2007 | Developed a care plan after discussion with interdisciplinary team. | Yes, CM provided health promotion recommendations and health education based on info collected during initial telephone contact. | NR | Yes, referred to specific services such as audiology and social work when needed by patient. | NR | Yes, embedded in geriatric clinic within primary care group. | |

| Author, Year | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported |
|---|---|--|--|---|----------------|
| Bernabei 1998 | Care with GP including office visits, home visits, nursing and social services, home aides and meals on wheels. | <u>Adjusted mean of functional outcomes* of CM vs. control:</u> 1) ADL: 2.0 vs. 2.6; p<0.001 2) IADL: 4.1 vs. 4.4 p<0.05 3) Mental status questionnaire: 2.8 vs. 3.4; p<0.05 4) Geriatric depression scale 10.9 vs. 12.8 p<0.05 Mortality CM vs. control; HR, (95% CI) 12 vs. 13 died HR: 0.99 (0.89-1.09) *Higher number=greater impairment | # of admissions of CM vs. control; HR (95% CI) 1) Nursing home: 10 vs. 15; HR: 0.81 (0.57 to 1.16) p=0.3 2) Acute hospital 36 vs. 51; HR: 0.74 (0.56 to 0.97), p<0.05 3) Nursing home or hospital: 38 vs. 58; HR: 0.69 (0.53 to 0.91) p<0.01 4) ER: 6 vs. 17; HR: 0.64 (0.48 to 0.85) p<0.025 | Adjusted mean number of medications in intervention (baseline vs. 1 year follow-up): 5.4. vs. 4.7 (p<0.05) | NR |
| Gagnon et al., 1999 Schein, 2005 | For usual care group, hospital and community services provided separately. | NCM vs. Control; Mean Difference (95% CI) Satisfaction: 25.0 vs. 23.9; 1.1 (-0.1, 2.3), NS ADL: vs. 13.6 vs. 13.4; 0.2 (-0.2, 0.6), NS IADL: 10.5 vs. 10.3; 0.2 (-0.5, 0.9), NS | NCM vs. Control; Mean Difference (95% CI) Hospitalizations: 0.5 vs. 0.4 0.09 (-0.05, 0.23), NS Hospital LOS: 13.0 vs. 11.9; 1.1 (-4.7, 6.9), NS ER Admissions: 1.2 vs. 0.9; 0.32 (0.01, 0.63) p =0.041 | NR | NR |
| Leung et al., 2004 | Usual care included of regular medical follow-up through the hospital service system of Hong Kong. | Baseline and post-intervention differences on the functional performance between groups (intervention vs. control):1) Level of ADL: +0.3 vs. 0.2 (1.1), NS2) Level of transfer: 0.4 (1.2) +0.2 (1.0), NS3) Level of continence +0.3 vs. 0.0, < 0.05 (intervention group worse) 4) Level of mental status -0.1 vs. 0.2, NS6) Level of mood symptoms -0.5 vs. -0.2, NS7) Level of impairment +0.1 vs. -0.1, NS | Mean difference in total number of outcome between the intervention vs. control groups: 1) Acute hospital bed-days: -3.3 vs. 3.9, p < 0.012) Rehabilitation hospital bed-days: -4.6 vs. 13.4, p= 0.053) Hospital bed-days: -7.9 vs. 17.2, p=0.0014) Episodes of unplanned hospital admission -0.2 vs. 0.3; p< 0.055) Episodes of hospital admission -0.7 vs. 1.3; p= 0.0016) Attendances at ED-0.2 vs. 0.4, NS7) Attendances at outpatient dept-0.8 vs. 0.2; p=0.05Attendances at geriatric day hospital -0.8 vs. -0.9; NS8) Home visits by community nurse 6.7 vs. -1.2; p < 0.05 | NR | NR |

| | | | | | |
|-----------------------------|---|---|---|----|----|
| Long 1999, Marshall 2000 | Usual care was determined by contracts without CM coordinating care. | CM vs. Control at Year 2 : <u>Functional Status</u> 1) Mean ADL: 6.5 vs. 8.1, p<0.01 2) Mean IADL: 5.6 vs. 6.1, p<0.05 3) Mean Health Status: 2.4 vs. 2.7, NS 4) Mean satisfaction: 2.3 vs. 2.3, NS | CM vs. control at Year 2: 1) Hospitalization rates, 36% vs. 30%, NS 2) Mean # of output visits: 14 vs. 10, NS 3) ER rate: 66 vs. 78%, NS 4) Mean number of patient ER visits: 1.6 vs. 1.4, NS | NR | NR |
| Rubenstein, 2007 | Usual care | Mean values: Y0, Y1, Y3 Y0= <u>Baseline Depression</u> CM: 4.9, 3.5, 3.9Control: 5.2, 4.1, 3.4 <u>Falls</u> (≥ 1 falls in previous 3 months): CM: 152, 79, 64Control: 160, 71, 54 <u>Incontinence</u> CM: 188, 118, 91Control: 199; 143; 105 <u>Functional Status</u> :a) ADLCM: 84.1; 85.3; 82.4 Control: 82.8; 82.3; 85.2 b) IADLCM: 53.9; 61.3; 56.5Control: 53.4; 59.1; 58.2 <u>Health Perception</u> : CM: 33.5; 36.0; 35.6Control: 33.7; 35.5; 36.2 | Mean values: Y1, Y2, Y3 <u>Hospital utilizations</u> (# participants admitted):CM: 210, 168, 159Control: 217, 171, 131# <u>hospital days</u> :CM: 0.57; 0.56; 0.55Control: 0.51; 0.56; 0.49 | NR | NR |

| Author, Year | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | | |
|---|---|---|---|---|
| | | List by specific outcomes (list of differential lost to follow-up) | Total withdrawals; withdrawals due to adverse events | Notes |
| Bernabei 1998 | NR/224/199 | 0/0/NR | 0/NR | Note: CMs from the national council (not involved in study) performed baseline and final assessments. |
| Gagnon et al., 1999 Schein, 2005 | 1893/680/427 Of 680, 253 were not frail. | NR/118/427 | NR/NR | |
| Leung et al., 2004 | NR/NR/92 | 6/0/926 died during study (2 in intervention, 4 in control) | 0/0 | |
| Long 1999, Marshall 2000 | NR/NR/317 | NR/109/208 | NR/NR | CM kept provider records of study participants. |
| Rubenstein, 2007 | 2646/1001/792 | 260/0/532 | 260/NR | |

| Author, Year | Population | Categorization of exposure | How subjects were referred to case management | Demographics (Age, gender, race) | Study Design/Type | Adjusted variables, selection of controls (for case-control studies) | Incidence (if cohort study) |
|--------------|---|---|---|--|--|--|-----------------------------|
| Chi 2004 | <p>Disabled elderly people. Elderly people, over the age of 60, living in the DaAn district of Taipei who had functional disability in the activities of daily living (ADL), instrumental activities of daily living (IADL), or cognitive function.</p> <p><i>Note: controls were selected from a list of disabled elderly people in the community with similar health and physical functions as the experimental subjects.</i></p> | Hospital-based care management model in close coordination with the discharge planning program at hospital. | NR | <p>Age: 47% 65-79 years; 47% >80 years 52% Female 36% < \$30,000</p> <p>Others: 1) 58% 3-5 chronic conditions 2) NR though 62% severely cognitively impaired</p> | Quasi-experimental with control, 6 months | Adjusted for demographics, number of chronic conditions, functional status and cognitive impairment. | NR |
| Herbert 2003 | Complex, frail elderly patients. | NR | Older than 65 years; moderate-to-severe disabilities (SMAF score $\geq 15/87$) and requiring >2 health care or social services | NR | Implementation of PRISMA program, aimed at improving continuity of care. | NR | NR |

| Author, Year | List Patient Health Outcomes | Results by patient health outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Effects of confounders, intensity of case management, duration | Notes |
|--------------|--|---|--|-------------------------------------|--|---|
| Chi 2004 | Self rated health (no units). Patient and caregiver satisfaction. <i>Note: results are adjusted multivariate logistic regression models.</i> | Self rated health CM vs. control: OR; 0.86 (95% CI: 0.36 - 2.08). Patient and the caregiver satisfaction the CM group was less likely to experience a decrease in satisfaction level. Patient: 0.05 (95% CI: 0.01 - 0.30) Caregiver: 0.25 (95% CI: 0.11 - 0.57) | CM group was more likely (OR 1.98; 95% CI = 1.05-3.74) than the controls to experience a decrease in expenditure. Mean values: Baseline: 45756; 37645 Follow-up: 48926; 43910 | NA | NR | Subjects in the control group were selected from a list of disabled elderly people in the community with similar health and physical functions. Usual care is provided by the Department of Health, Taipei City Government. CM included the following elements: 1) case finding, referral to local services in the community; 2) consultation with subjects and caregivers; 3) screened for urgent needs (via questionnaire); 4) comprehensive assessment and subsequent care plan; 5) implementation of care plan; 6) monitoring and reassessment |
| Herbert 2003 | Caregiver burden, functional decline | Reduced caregiver burden Function decline (control vs. study patients): 12 months: 49% vs 31%; p=.002 24 months: 36% vs 26%; p=.066 | NA | NA | NR | |

Chronic conditions

| Author, Year | Population | Categorization of exposure | How subjects were referred to case management | Demographics (Age, gender, race) | Study Design/ Type | Adjusted variables, selection of controls (for case-control studies) |
|--------------|--|--|--|----------------------------------|---|---|
| Duke 2005 | Patients had an average of 12 chronic conditions and took 15 medications daily. | NR | >65 years of age or older, resided in a private home or in 1 of 3 local assisted living communities in Pitt County, and received their health care at the BSOM Geriatric Clinic. | >65 years of age, other NR | Pre/post enrollment in case management program | NR |
| Keating 2008 | Recent exacerbation or decompensation of chronic illness <90 days; recent falls (2 in 2 months); recently bereaved and at risk for medical decline (death of spouse or family member in past 6 months); cognitively impaired, living alone, medically unstable, or in receipt of a high intensity social service package; registration with one of the practices involved in the Evercare project. | Use the EARLI score to categorize patients into low, medium and risk of hospitalization. If high risk, received case management. | Patients at risk of hospitalization. | > 65 years of age, others NR | Pre/post demonstration project | NR |
| Kruse 2010 | Patients \geq 65 years and seen at least 3 times by a family medicine outpatient team during 1998. | NP (nurse partner) assessed patients' health maintenance needs, reviewed medications, saw patient at office, provided patient education, coordinated referrals to specialty physicians and home health services, and provided follow-up phone care to check on patients after doctor visits or hospitalizations. | Patients at least 65 years of age and seen at least 3 times. | Mean age: 76 years 67% Female | Quasi-experimental with control, 5 years followup | Adjusting for age and sex Selection of controls: matched 1:2 with patients who had \geq 3 outpatient visits with another clinic team during 1998 |

| Author, Year | Incidence (if cohort study) | Patient Health Outcomes | Results by patient health outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Effects of confounders, intensity of case management, duration | Notes |
|--------------|--|-------------------------|---|--|-------------------------------------|--|---|
| Duke 2005 | NR | MMSE and MGDS scores | Reported that MMSE score declined over study period and MGDS showed an improved perception on QOL | 54% reduction in ER visits; 69% reduction in hospital admissions; 64% reduction in hospital LOS | NA | NR | Case management for both medical and mental conditions, telehealth assessments for medically compromised patients, hospice use and acceptance for end-of-life care needs, education for the patient and family members or caregivers about specific care needs and concerns |
| Keating 2008 | NR | NR | NR | 50% decrease in hospital admissions 49% decrease in number of days in the hospital | NA | NR | Case management team included a lead GP with 1 hr/week to review progress; a social worker and a community matron supplemented regular GP practice care of patients. |
| Kruse 2010 | 1) ED visits (intervention vs. control groups: 0.71/1000 patient-days vs. 1.04/1000 patient-days; p= 0.034 2) Urgent care visits: 0.17/1000 patient-days vs. 0.43/1000 patient-days; p< 0.001 | Mortality | Intervention vs. control: Deaths: 26.9% vs. 27.3%; p= 0.94 | Relative risk reduction of intervention vs. control: ED visits: 0.32 (95% CI, 0.03–0.52) Urgent care visits: 0.59 (95% CI, 0.40–0.72) | NA | NA | |

| Author, Year | Population | Categorization of exposure | How subjects were referred to case management | Demographics (Age, gender, race) | Study Design/ Type | Adjusted variables, selection of controls (for case-control studies) |
|---------------------|---|---|--|--|---|---|
| Lu 2005 | Community elders \geq 65 years with HTN, diabetes mellitus and hypercholesterolemia (HC), known as the three highs. | Patients diagnosed at least twice with one of the three highs in Case Management Record (CMR). | NR | Mean age=72.6 years 60% Female 74% had HTN, 55% had diabetes, 15% with HC. 61% had 1 of 3 highs, 35% had 2 of 3 highs and 4% had all 3. | Before and after design extracting secondary data from a 3-month CM program. Data extracted from CMR. | Used paired t-tests to evaluate before and after results. |
| Luzinski 2008 | Geriatric individuals with \geq 1 chronic illnesses. | CMs assess needs and develop individualized care plans to determine interventions as needed and include assistance with medication management, coordination of transportation and coping strategies to help patient manage chronic illnesses more effectively. CMs promoted self-advocacy by patient education and referring to community resources. CM maintained relationships with patients through home visits and telephone calls. | Referred to CCM program for many reasons and include confusion with medications or treatment plans, chronic conditions at risk of complications (e.g., CHF, COPD, diabetes), frequent ED visits or hospitalizations, poor coping skills, inadequate family or support systems, insufficient financial resources, frequent missed appointments, frequent visits for unnecessary problems and ineligibility for home care. | NR | Before and after design, 6 months previous to enrollment compared to post-6 months. | NR |
| Onder 2007 | Random sample of elders admitted to the home care programs in 11 different European Home Health Agencies (2001-2003) | Home care program with case management and the standard (without CM). | Patients receiving home care services. | Mean age= 82 years 74% Female | Retrospective cohort | Demographic variables, number of chronic diseases, functional and cognitive impairments and hospitalization in the past 6 months. |

| Author, Year | Incidence (if cohort study) | Patient Health Outcomes | Results by patient health outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Effects of confounders, intensity of case management, duration | Notes |
|---------------|--|--|---|---|---|--|-------|
| Lu 2005 | NA | SBP, DBP, AC sugar, PC sugar and cholesterol | Mean values Before vs. After CM; p-value CM 1) SBP: 159.4 vs. 150.8; p=.000 2) DBP: 91.1 vs. 88.6; p=.000 3) AC sugar: 208.8 vs. 191.8; p=.000 4) PC sugar: 288.3 vs. 254.0; p=.003 5) Cholesterol: 281.3 vs. 263.1 ; p=.122 | NR | Significant change in SBP related to gender and location; change in cholesterol related to patient ethnicity. | NA | |
| Luzinski 2008 | NR | NR | NR | 1) Cost: Saved an average of \$93,000/yr for the CCM patient or an annual savings of \$233/patient. 6 months enrollment vs. 6 months preceding enrollment: 2) ED visits: 38% decrease 3) Inpatient admission: 63% reduction | NA | NR | |
| Onder 2007 | Nursing home admission (number of events), no CM vs. CM 274 vs. 81 | Caregiver dissatisfaction and distress | CG Dissatisfaction (no CM vs. CM): 0.47 (0.29–0.73) CG Distress (no CM vs. CM): 1.04 (0.78–1.38) | OR (95% CI) of no CM vs. CM Nursing home admission OR: 0.56 (0.45-0.63) | NA | No effect of measured confounders. | |

Appendix J. Evidence Tables: Case Management for Dementia

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If Yes, include)? |
|----------------------------------|---|--|--|--|--|--|
| Callahan, 2006 (n=153) good | The authors tested the effectiveness of a collaborative care model to improve the quality of care for Alzheimer patients. Primary hypothesis: patients in the intervention group would have lower total Neuropsychiatric Inventory (NPI) scores compared with usual care patients at 12 mo. | Possible or probable Alzheimer disease based on Diagnostic and Statistical Manual of Mental Disorders criteria. | Nursing home pts, non-English speakers, no access to a telephone, or no caregiver consent to participate in the study. | RCT (randomized by physician) Duration: 1 year intervention | Age mean: 77 Female: 43% Race: Black: 50% Medicaid recipient: 73% Married: 48% Mean MMSE score: 18 | Alzheimer disease and or Dementia Most had multiple comorbid chronic conditions (mean chronic disease score:8) |
| Challis, 2002 (n= 95 dyads) poor | To evaluate the effect of a model of case management embedded in a community mental health setting for the elderly | Diagnosis of dementia significant needs unmet by the existing services, and perceived risk of institutionalization. | NR | Quasi-experimental design Duration: 2 years, | Mean age: 81 years; 30% male Race/ethnicity: NR | Dementia Comorbidities: NR |
| Chien, 2008; (n=88 dyads) fair | To test the effectiveness of a dementia care management program on caregiver & patient health outcomes. | Inclusion criteria for caregivers: 18 years old or >; living with & caring for a relative diagnosed with Alzheimer's type dementia(based on DSM-IV criteria) | Caregivers with mental illness of their own, or who cared for the patient < 3 months. | RCT, 6 months; 12 mo. F/U period | Caregiver Mean age: 43.6 ± 9.2 (range: 34-65) Female caregivers: 64% Pt mean age: 67± 6.8 (range 64-79) Female: 43% MMSE mean: 17.5 (SD 4.7) | Alzheimer's disease related dementia 1) NR 2) NR |

| Author, Year (Quality Score) | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if Yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager |
|-------------------------------------|--|--|---|--|--|---|--|
| Callahan, 2006 (n=153) good | Multiple comorbidities; socioeconomically disadvantaged. | Medicaid recipient: 73% | NR | Two AP (geriatric NPs) | CMs monitored client/caregiver symptoms and stressors and instituted behavioral interventions based on protocols; collaborated with PCP on pharmacological therapy; worked in collaboration with PCP and other multidisciplinary team members. | NR | Embedded with primary care practices |
| Challis, 2002 (n= 95 dyads) poor | Significant unmet needs and risk of institutionalization | UK - National Health Care System | UK - National Health Care System | Unclear | Provided appropriate services; had access to all relevant health and social service resources. | NR | Secondary health care setting with a community mental health team for older people, with a specific target population of older people with dementia. |
| Chien, 2008; (n=88 dyads) fair | NR | NR (Hong Kong study) | NR (Hong Kong study) | Nurse | An education & support group for family members in addition to routine dementia care through the dementia resource center (pharmacotherapy, social & recreational activities for patients). | Case managers received 32 hours of formal training by the study researchers | Dementia resources center |

| Author, Year (Quality Score) | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] |
|-------------------------------------|--|---|---|---|---|---|---|
| Callahan, 2006 (n=153) good | Clinic visits, telephone calls, & group sessions | 75 patients per year | Caregivers and patients seen by CM in primary care clinic bimonthly; lengthened to monthly for a period of 1 year; telephone interviews at 6, 12, and 18 months. Face-to-face number of CM contacts: mean [SD], 7.7 [5.8]; median, 7 [range, 0-28] over 12 months; telephone contacts: (mean [SD], 6.7 [5.8]; median, 5 [range, 0-35]). | Scheduled visits at primary care clinic. | Yes | Education on communication skills; caregiver coping skills; legal and financial advice; patient exercise guidelines; caregiver guide; optional support group counseling (56% of patients/caregivers attended at least 1 session). | Yes (main focus of CM intervention). |
| Challis, 2002 (n=95 dyads) poor | NR | 20–25 cases | NR | Mean of 17 days/year visits (in-home visits inferred) | "Case managers maintained structured care plans which were completed at regular intervals using a tool specifically designed for the study." | NR | NR |
| Chien, 2008; (n=88 dyads) fair | During 12 sessions, plus home visits with education about dementia care | NR (unclear, each family received 1 CM--total number of CMs NR) | Home visits every other week; Twelve 2-hour sessions every other week; | Home visits every other week; Twelve 2-hour sessions every other week (assumedly held at the dementia resource center); | Provided a structured needs assessment and worked with caregivers to prioritize problem areas & formulate a multidisciplinary education program on effective care | Caregiver education: educational workshop about dementia care (three sessions) | Educational workshop about the family role & strength rebuilding (six sessions) community support resources (one session) |

| Author, Year (Quality Score) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|-------------------------------------|--|---|--|---|--|---|
| Callahan, 2006 (n=153) good | Yes | Yes Adjustment: unclear (collaborated with PCP) | Yes; PCP & CM had weekly meetings with a multidisciplinary support team. | CM supported by a web-based longitudinal tracking system: managed patient contact schedule, tracked patient's progress and current treatments, communicated patient's and caregiver's clinical status to care team. | "Augmented usual care": counseling for patient & care giver by geriatric NP regarding diagnosis of Alzheimer disease, written educational materials, & a referral to community resources; PCP treated as deemed appropriate. | Intervention patients: experienced significant improvements in total NPI scores (reflecting fewer behavioral symptoms) at 12 and 18 mo compared with pts who received usual care; NDD for measures of cognition or function; No significant differences in rates of nursing home placement. |
| Challis, 2002 (n=95 dyads) poor | Identified as part of CM services | NR | NR | NR | Usual care receiving services in a similar community mental health setting without a care management service. | QOL measures : (statistically significant ($p<0.05$) results at 6 months) CM more satisfied with their home environment, improvements in social contact; reduction in distressing behavior Quality of care measures: (statistically significant results at 6 months and maintained at 12 mo) reduction in needs overall as rated by carers $p<0.001$; reduction in ADL needs $p<0.01$; reduction in levels of risk $p<0.05$; Caregivers' needs and QOL: (statistically significant ($p<0.05$) results for CM group at 12 mo) reduction in total hrs of input by carers; reduction of felt burden for carers. Destination outcomes: Differences between the two groups in the rate of placement are not evident until after the first year. By 18 months 56% receiving CM and 51% receiving usual care remained in their own homes. At 2 yrs, 51% of CM group remained at home compared with 33% of the usual care group. |
| Chien, 2008; (n=88 dyads) fair | Coordination of all levels of family care based on results of the needs assessment; | Routine dementia care at the center included pharmacotherapy and symptom severity assessment. Adjustment NR | NR | NR | Routine dementia care through the dementia resource center (pharmacotherapy, social & recreational activities for patients, and written caregiver educational materials), and 6 monthly education sessions; | Statistically significant difference ($p<.01$) between groups favoring the intervention group: Mean NPI score at 6/12 months-Dementia care: 68.1/64.2, standard care: 84.5/85.1; |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals; withdrawals due to adverse events |
|----------------------------------|--|---|----------------|---|--|--|
| Callahan, 2006 (n=153) good | Usual care: fewer cumulative physician or nurse visits (mean [SD], 5.6 [5.1]; median, 4 [range, 0-27]) than intervention patients (mean [SD], 9.3 [13.4]; median, 5 [range, 0-67]) (P=.03) and differences persisted at 18 months (7.5 [median, 5.5; range, 0-36] vs 12.9 [median, 9.0; range, 0-127]; P=.02). | NR | NR | 464 patients screened; 258 patients ineligible 253 no diagnosis of Alzheimer Disease; 5 no caregiver; 53 patient refused/ 74 Physicians randomized (153 Patients) | 37 Physicians /(69 Patients) Assessment: 49 Patients Assessed --69 Patients Included in Primary Analyses; 37 Physicians Assigned to Intervention (84 Patients)18-mo Assessment: 65 Patients Assessed; 84 Patients Included in Primary Analyses (ITT) | NR (deceased but cause of death NR) |
| Challis, 2002 (n= 95 dyads) poor | The differences in service receipt constitute the main differences in costs, with the majority of the increased cost for CM accounted for by total professional visits (24%) [CM 63 days/yr, usual care 33.5 days/yr, p<0.01], total home care (44%) [CM 13.3 days/yr, usual care 4.7 days/yr], and acute hospital care (27%) [CM psych 12.4 days/yr and medical 18.3 days/yr versus usual care psych 7.0 days/yr and medical 13.7 days/yr) | NR | NR | Screened: NR; eligible: NR; enrolled 95 pairs (person with dementia plus caregiver) | Attrition by death at 6mo = 2% in each group; at 12 mo = 7% in each group; destination outcome and cost comparisons were based on 43 matched pairs; | NR |
| Chien, 2008; (n=88 dyads) fair | Statistically significant between group differences in frequency (p<.01) and duration (p<.001) favoring the intervention group: Mean number of times at 6/12 months-Dementia care: 3.2/2.9); standard care: 5.4/6.4 ; Mean duration (days per month) at 6/12 months-Dementia care: 11.1/9.4 days; standard care: 16.9/17.1 days | Statistically significant between group differences favoring the intervention group p<.001: Family Caregiving Burden Inventory Mean at 6/12 months-Dementia care: 56.7/48.3 ; standard care: 63.0/65.9; World Health Organization QOL Scale Mean at 6/12 months-Dementia care: 75.1/81.4; standard care: 69.8/65.2; | NR | Total of 88 of 200 pairs of eligible patients & primary caregivers | 1 pt in the standard care group died at 6 month posttest; 2 intervention group dyads failed to complete the program but remained in the study group/88 dyads analyzed. | None |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If Yes, include)? |
|---|--|--|---------------------------|--|---|---|
| Chu, 2000; (n=78 dyads) poor | To determine whether a comprehensive home care program for early stage AD pts would delay caregiver burden and delay institutionalization. | Patients: possible diagnosis early stage AD; no concomitant illness; not at risk of placement to long term care; lived in the city; not in or eligible for regular home care program Criteria for caregivers included: principle informal caregiver for the client; no serious illness; lived with the client or in the city. | Not diagnosed with AD | RCT Duration: 18 months | Age : 68% 75 years or > Gender :50% Female Race and/or ethnicity: NR SES: NR Education level: 45% 10 years or less; mean MMSE score 23; | Mild AD 1) No comorbidities per protocol 2) NR |
| Clark, 2004 (n=210) poor | To evaluate effects of care consultation delivered within a partnership between a managed health care system & an Alzheimer's Association chapter. A priori hypothesis: "patients offered care consultation will have decreased utilization of managed health care services & improved psychosocial abilities." | Kaiser member, dementia or diagnosis code for memory loss, 55 years or >, live outside nursing home, live in service area; | NR | RCT, 12 months | NR | Dementia or memory loss 1) NR 2) Depression; N=85 |
| Eggert, 1991; (n=520) poor Zimmer, 1990; (subgroup analysis, n=94) | To compare two models of case management (team care and centralized individual care) for SNF patients living at home. A priori hypotheses: Team care would result in 1) same or lower overall health care utilization and expenditures; 2) more satisfaction with health care provided; 3) better functional and health status, or no difference than controls in degrees of change; 4) greater informal supports; | Age 18 or older, at risk or in need of long-term care at the skilled nursing level, living at home, eligible for Medicaid and Medicare waivers, residing within the catchment area. | NR | RCT | Median age: 77; Females: 73%; Race: Non white 24%; Medicaid eligible: 47%; | Chronically ill, disabled, elderly.CVD - 29%, Arthritis 29%, Diabetes 20%, Dementia 18% Stroke effects 17%, Cancer 17%; |

| Author, Year (Quality Score) | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if Yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager |
|--|--|--|---|--|--|---|---|
| Chu, 2000; (n=78 dyads) poor | NR | N/A (Canada) | No | SW | CM responsible for providing/coordinating need-based services for pts enrolled in a comprehensive home care program; part of a multidisciplinary team; | NR | NR |
| Clark, 2004 (n=210) poor | NR | Kaiser | Kaiser | Social workers | Alzheimer's Association care consultation--Care consultants initiate contact and follow a standardized protocol for service delivery includes helping patients organize an efficient & coordinated helping network help patients cope w/ emotional issues. | NR | NR |
| Eggert, 1991; (n=520) poor Zimmer, 1990; (subgroup analysis, n= 94) | Elderly, chronically ill, disabled, eligible for skilled nursing care. | Medicare (86%), Medicaid (47%) | NR | 2 CMs per team: community health nurse and social worker; | Neighborhood Team Model: CM responsible for assessment, care plan development, arrangement/provision of some direct services, patient monitoring, and approval of Medicare and Medicaid services. | NR | Community-based |

| Author, Year (Quality Score) | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] |
|---|--|-----------------|---|--|---|--|--|
| Chu, 2000; (n=78 dyads) poor | Telephone, home visits | NR | Monthly contact by phone or home visit; frequency increased as needed. | In-home visits (frequency varied according to need) | CM assisted pts, w/ long term planning, assessed clients & caregivers with : Mini-Mental State Examination (MMSE) Geriatric Depression Scale-Short Form (GDS) & Alberta Assessment & Placement Instrument | Education regarding disease process & caregiver skill training | Yes, provided to caregivers |
| Clark, 2004 (n=210) poor | mainly phone contact; | NR | Varies according to need; average of 10 communication contacts w/ each patient and/or caregiver per year. | during initial intake assessment | structured initial assessment, identified problems & developed strategies for using personal, family, & community resources | Education on simplifying daily activities, establishing manageable routines, & keeping a journal | Based on "empowerment conceptual framework"; & families ability to make their own decisions if given sufficient information & coaching |
| Eggert, 1991; (n=520) poor Zimmer, 1990; (subgroup analysis, n= 94) | Home visits | 40-45 | Individualized | Home visits; emphasis on in-person contact | Yes | Individualized | Yes |

| Author, Year (Quality Score) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|---|--|--|--|--|---|---|
| Chu, 2000; (n=78 dyads) poor | Coordinated (as needed) a wide variety of support services; | NR Adjustment: No | Yes, physicians assessed medical factors & project coordinator/case manager applied other eligibility criteria | NR | Control group given an information package on community resources. | No significant differences between groups for any of these outcomes level of cognitive impairment; frequency of behavior problems; depressive symptoms; delayed inst Institutionalization. |
| Clark, 2004 (n=210) poor | Enlist support & involvement from family members & friends; connect families to additional community resource; connect to mental health resources. | NR | NR | Yes, Kaiser electronic medical records | patients & caregivers able to independently contact Association & use services (education & training programs, support groups, respite care); no interaction with Care Consultants/ no care planning process; | depression significant for intervention variable & memory difficulties --depression in the intervention group decreases for patients whose memory difficulties worsen from T1 to T2.(beta=0.33; p 0.07), ;significantly decreased feelings of embarrassment &isolation due to memory problems (beta= 0.17; p 0.07), and decreased difficulty coping with memory problems (beta=0.22, p 0.05) |
| Eggert, 1991; (n=520) poor Zimmer, 1990; (subgroup analysis, n= 94) | Yes | Yes, included some hands-on nursing care. | No | NR | Centralized Individual Model: Core CM functions (assessment/ planning) delegated to hospitals and certified home health agencies | Subgroup analysis: No significant difference between groups for satisfaction, functional status, informal supports. |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events |
|--|--|--|---------------------------|---|---|---|
| Chu, 2000; (n=78 dyads) poor | NR | Measurement of caregiver burden; Significant difference in favor of the intervention at 6 mos, but not at 3, 10, 14, and 18 months. | NR | Enrolled 78 pairs of clients/ caregivers | Analyzed: 37 pairs in treatment & 38 controls; analyzed 75 pairs (3 pairs clients / caregivers excluded for wrong diagnosis) | NR |
| Clark, 2004 (n=210) poor | Hospital admission & ED visits significant for the intervention variable & self-reported memory difficulties (beta= 3.49; p< 0.10, beta=2.56; p < 0.10, respectively); sub-sample of patients w/ average or greater than average memory difficulties, coefficients for the intervention variable negative & significant for both hospital admission and ED visit (beta= 2.97; p=0.07 & beta=2.30; p=0.03) | Among the patients with more self-reported memory difficulties, the intervention group was more satisfied with the quality of Kaiser services: (beta=0.23; p 0.07) | NR | Screened: 525; Eligible 233; Enrolled 210 | 121 of the 210enrolled cases completed | 89 completed 1 year followup |
| Eggert, 1991; (n=520) poor Zimmer, 1990; (subgroup analysis, n= 94) | Overall costs for team-managed pts were 14% less than for individual-managed pts (p=.065, CI -34.2% to +1.3%); subgroup analysis of pts with dementia: Overall costs for team-managed pts were 41% less than for individual-managed pts. | NR | NR | Screened NR/ eligible 563; enrolled (n=520) | Unclear | NR |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If Yes, include)? |
|--|---|--|--|--|--|---|
| Eloniemi-Sulkava, 2001; (n=100 dyads) good | To determine whether community care of demented patients can be prolonged by means of a 2-year support program based on nurse case management. | age 65 and older and entitled to payments from the Social Insurance Institution for community care because of a dementing disease; had no other severe diseases; living at home with an informal caregiver; residing in one of five Finnish municipalities | if patients and their caregivers were not able to participate in annual training courses; | RCT - 2 years; enrollment between Oct 1993 and Jan 1995; 2 yr FU. | Mean Age 79 years; Range (65-97); Female 53%; Race/ethnicity NR; SES, NR; Moderate dementia 31%, Severe dementia 30% | Dementia Comorbidities: NR |
| Eloniemi-Sulkava, 2009; (n=125 dyads) good | to determine whether a 2-year multicomponent intervention program can prolong community care of people with dementia | Couples: eligible if one spouse was caring for a partner with dementia at home and living in Helsinki, Finland; participants with dementia: diagnosis of dementia based on specialists' exams. | Couples in which one spouse had another severe disease with a prognosis of an estimated life span of <6 months. | RCT - 2 years; enrollment Feb 1 to May 31, 2004; end of FU Jan 31, 2006; (length of intervention varied between 20 to 24 months) | Caregiver Mean age: 75; Female caregivers: 63%; Race/ethnicity NR; SES, NR; Pt mean age: 78; Female: 38% Stage of dementia according to MMSE: Mild, 26% Moderate 55% Severe, 19% | Dementia (85% Alzheimer's), Comorbidity: NR |
| Jansen, 2011; (n=99 dyads) good | To compare the effects of case management and usual care among community-dwelling older adults with early symptoms of dementia and their primary informal caregivers. A priori hypothesis: Caregivers in the case management group would have an improved sense of competence and quality of life, and experience less symptoms of depression and burden, while the usual care group would remain stable or decline. Also, the QOL of care recipients in the case management group would improve, while those in the usual care group would be stable or decline. | score on the MMSE <24 or a risk of dementia of 50% or more according to the 7MS; has a primary caregiver; | For pts: assistance by an outpatient geriatric or psychiatric team for cognitive problems, terminal illness, insufficient command of the Dutch language, participation in other research projects, institutionalization; For caregivers: terminal illness, providing <1 hr of care/week, insufficient command of the Dutch language; | RCT, 1 year intervention, | Pt mean age: 82; Female: 64%; Race NR; SES NR; Mean MMSE score: 22; Caregiver Mean age: 63 Female caregivers: 70% Living with pt: 44% | Dementia >1 chronic disease: 76% |

| Author, Year (Quality Score) | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if Yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager |
|--|--|--|---|---|---|--|--|
| Eloniemi-Sulkava, 2001; (n=100 dyads) good | High need for support services | NR (Finish healthcare system) | NR (Finnish healthcare system) | Registered nurse with a public health background | Patients and their caregivers were enrolled in a 2-year support program based on nurse CM (involved systematic and comprehensive support by the FCC, who had access to the program physician. | Extensive training, support, and advice in dementia care from dementia specialists at the beginning of the study and throughout | Worked at the Department of Public and General Practice in the University of Kuopio |
| Eloniemi-Sulkava, 2009; (n=125 dyads) good | NR | Finnish healthcare system | Finnish healthcare system | Position Title: Family Care Coordinator (FCC); trained public health registered nurse with advanced practice education (3.5 years) and special education in dementia care (1 year); | FCC responsible for providing/coordinating individual, need-based services; A home visit from the FCC initiated the intervention; The core elements of the intervention (FCC's actions, a geriatrician's medical investigations and treatments, goal-oriented support group meetings for spouse caregivers, and individualized services); | A dementia expert trained the FCC and geriatrician for their work and tutored them throughout the intervention | The FCC and the geriatrician worked in the Central Union for the Welfare of the Aged in Helsinki |
| Jansen, 2011; (n=99 dyads) good | burden of AD disease | NR (Netherlands) | N/A | Three district nurses who are specialized in geriatric care. | Assessment, planning, coordination, collaboration, & monitoring of care; | Nurses were trained in working with the computerized assessment/management program used in the study, and in organizing family-meetings. They also attended seminars on how to deal with dementia patients and their caregivers. | NR |

| Author, Year (Quality Score) | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] |
|--|---|---|--|---|--|---|--|
| Eloniemi-Sulkava, 2001; (n=100 dyads) good | In-home visits and phone calls; 24 hr availability by mobile phone | 50 patients maximum over the course of the study | Frequency of contacts varied from once a month to five times a day (problematic situations at home accounted for the great variability) (author's note: caregivers contacted FCC after hrs only 10 times in 2 years) | In-home visits (frequency varied according to need) | Yes | Annual training courses (10-day course at study entry, 5-day course at 1 and 2 yrs) for patients and their caregivers; included a patient medical check-up and psychological assessment | Yes |
| Eloniemi-Sulkava, 2009; (n=125 dyads) good | FCC Services (Range per Family), n: Phone calls to and from families, 2,192 (1–91); FCC Services (Range per Family), n: Home visits, 337 (1–43), Office visits, 23 (1–4), | 50 to 60 couples per FCC in partnership with a geriatrician | FCC Services (Range per Family), n: Phone calls to and from families, 2,192 (1–91); | FCC Services (Range per Family), n: Home visits, 337 (1–43), Office visits, 23 (1–4), | During the first home visit by the FCC, the initial support plan was created in cooperation with the couples | Three 2-hour dementia information sessions for caregivers and family members; large proportion of pts received home based exercise training; (part of the intervention, FCC role not defined) | Caregivers participated in 5 goal-oriented peer support group meetings during the first FU yr (part of the intervention, FCC role not defined) |
| Jansen, 2011; (n=99 dyads) good | In person | 3 nurse case managers, study n=99 dyads; | At least 2 home visits at the start of the intervention; telephone contact at least every 3 months; nurses available for telephone consultation; mean time of 10.8 hrs/yr per dyad (range 0.75–28 h). | Two initial home visits. | Care plan formulated during first and second home visits; Met monthly to discuss innovations & geriatric cases; supervised by a staff member | unclear (although seems implicit) | Organized family-meetings to educate relatives, improve social support & relieve caregivers; |

| Author, Year (Quality Score) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|--|---|---|---|--|--|---|
| Eloniemi-Sulkava, 2001; (n=100 dyads) good | Yes (assistance with arrangements for social and healthcare services) | Yes, Adjustment unclear | FCC had access to the program physician for consultation and medical care as needed | NR | Usual services provided for geriatric patients in community care by the municipal social and healthcare system or the private sector | During the first months, the rate of institutionalization was significantly lower in the intervention group than in the control group ($p=.042$) but the benefit of the intervention decreased with time ($p=.028$); Estimated probability of staying in community care up to 6, 12, and 24 months was 0.98, 0.92, and 0.63 in the intervention group and 0.91, 0.81, and 0.68 in the control group, respectively. (survival curves suggest that severely demented subjects benefited the most from the intervention (median time of staying in community care: intervention group 647 days, control group 396 days)) |
| Eloniemi-Sulkava, 2009; (n=125 dyads) good | FCC Services (Range per Family), n: Phone calls for arranging services 1,928 (1–97); services were primarily arranged through the municipal social and healthcare system; if required services were not available in the municipal service system, the FCC was able, through an intervention budget, to tailor services for the couples using private sector or nonprofit organizations | The FCC operated in partnership with the geriatrician, whose medical expertise the intervention couples had at their disposal Adjustment: NR | The intervention couples continued their own physician's visits; FCC and geriatrician cooperated closely with them; | NR | Usual community care: receiving care and services from the municipal social and healthcare system, the private sector, or both, depending on their own initiative (the Finnish municipal service system includes a large variety of services, and families with members with dementia have the right to access these services); families were provided with information and referrals to community resources, written educational materials; | At 1.6 years, control group vs. intervention group in long-term institutional care (25.8% vs. 11.1%, $P=.03$). At 2 years, NSD. The 2-year adjusted hazard ratio for the intervention group was 0.53 (95% CI = 0.23–1.19, $P=.12$); |
| Jansen, 2011; (n=99 dyads) good | Assessment, planning, coordination, collaboration, & monitoring of care. | Yes; the nurses referred patients and caregivers to other health care professionals, including diagnostic services, and they monitored results. | The nurses visited the PCPs to report on their patients. | CM utilized a computerized multidimensional instrument which assessed the general functioning of the patient, and provided management protocols; | Participating pairs received care (health care and welfare services available in the Netherlands) depending on their own initiative. They had no access to family meetings, or the computerized assessment; | No statistically significant and clinically relevant differences over time between the two groups for QOL. |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals; withdrawals due to adverse events |
|---|---|--|---------------------------|--|---|---|
| Eloniemi-Sulkava, 2001; (n=100 dyads) good | NR | NR | NR | Screened 141; eligible 126; enrolled 100; intervention (n=53), control (n=47) | 100% analyzed | None |
| Eloniemi-Sulkava, 2009; (n=125 dyads) good | Intervention led to reduction in use of community services and expenditures. The difference for the benefit of intervention group was - 7,985 Euro (95% CI= -16,081 to - 1,499, P=.03). When intervention costs were included, the differences between the groups were not significant. (The largest differences between the intervention and control groups appeared in the use of long-term institutional care (intervention 2,340 days vs. control 5,351 days) and in the district nurses' home visits (388 vs. 1,931) | NR | NR | Screened n=197 couples; Eligible/enrolled n=125 couples; intervention (n=63 couples), control (n = 62 couples); | 100% of those enrolled were included in the analysis | NR |
| Jansen, 2011; (n=99 dyads) good | NR | No statistically significant and clinically relevant differences over time between the two groups. | NR | Screened: NR, Eligible NR; Enrolled 99 dyads; Intervention (n=54), Control (n=45) | Withdrawn/died: Intervention 26%; Control 34% | NR |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross- over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If Yes, include)? |
|--|--|---|--|---|--|---|
| Mittelman, 2006 (1); Mittelman, 2004 (2); Mittelman, 2004 (3); Roth, 2005 (4); (n=406) (good) | To determine the effectiveness of a counseling & support intervention for spouse caregivers of Alzheimer disease patients: delaying time to nursing home placement; caregiver symptoms of depression; negative caregiver appraisals of behavior problems; changes in social support and psychosocial outcomes; | Caregiver living w/AD patient; relative of caregiver or patient living in the NY metro area; agree to participate in a support group; | NR | RCT; enrollment 1987-1997; 17-yr longitudinal FU; | Caregiver Mean age: 71; Female caregivers: 60%; Race: NR; SES: NR Pt mean age: 74 Gender: NR Stage of dementia: Mild 34% Moderate 41% Severe 25% | Alzheimer's patients (the caregivers of) Comorbidities: NR |
| Mittelman, 2008 (1); Brodaty, 2009 (2); (n=158 dyads) (need quality rating) | To determine the effectiveness of a counseling & support intervention for spouse caregivers of Alzheimer disease patients taking donepezil: 1- caregiver symptoms of depression; (A priori hypothesis: the psychosocial intervention would reduce caregiver depressive symptoms) 2- rates of nursing home placement and mortality; | Patient: Meet specified criteria for probable AD, Global Deterioration Scale score of 4 to 5, no contraindication to donepezil; stable on other medications; in good physical health; able to give informed consent or not object to participating, reside in the community with their spouse; Spouse: primary caregiver; | Spouse caregiver: previous formal caregiver counseling; no family member other than the caregiver available to participate in family counseling. | RCT; 2 yr intervention; up to 8.5 yrs FU | Caregiver age: Mean = 71.3 yrs (SD: 8.2, 47-88 yrs); Female caregivers: 56%; Race: NR; SES: NR Pt age: Mean = 73.8 yrs (SD: 7.48, 51-91); Gender: NR Stage of dementia: (GDS 3) 2% Mild (GDS 4) 57% Moderate (GDS 5) 39% Severe (GDS 6) 2% | Alzheimer disease 1) NR 2) Caregiver depression: Moderate (12%), Severe (1%) |

| Author, Year (Quality Score) | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if Yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Primary Location of Case Manager |
|--|--|--|---|--|---|--|---|
| Mittelman, 2006 (1); Mittelman, 2004 (2); Mittelman, 2004 (3); Roth, 2005 (4); (n=406) (good) | Caregiver burden; Pt with AD at high risk for nursing home placement; | NR | NR | Family counselor | Six sessions of individual & family counseling, support group participation, & continuous ad hoc telephone counseling; | NR | NR, (likely NYU Alzheimer's Disease Center) |
| Mittelman, 2008 (1); Brodaty, 2009 (2); (n=158 dyads) (need quality rating) | Burden of AD disease | NR; (3-country study: USA, UK, and Australia) | NR; (3-country study: USA, UK, and Australia) | Counselor | Five sessions of individual and family counseling for the caregiver within 3 months of enrollment and continuous availability of ad hoc telephone counseling; (pt received donepezil) | NR | NR |

| Author, Year (Quality Score) | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] |
|--|---|-----------------|---|---|------------------------------------|---|---|
| Mittelman, 2006 (1); Mittelman, 2004 (2); Mittelman, 2004 (3); Roth, 2005 (4); (n=406) (good) | Face to face counseling sessions, ad hoc telephone counseling & support group; intervention support provided for an unlimited time; | NR | Six counseling sessions occurred within 4 months of enrollment; ad hoc telephone counseling; | Two individual and four family counseling (location NR, likely NYU Alzheimer's Disease Center) sessions tailored to each caregiver's specific situation, encouragement of weekly support group participation, and availability of ad hoc telephone counseling. | Yes | Aside from scheduled counseling sessions in first 4 months, agreement to participate in a support group was an eligibility criterion (58% joined a group within 12 months) | Yes (main focus of intervention) |
| Mittelman, 2008 (1); Brodaty, 2009 (2); (n=158 dyads) (need quality rating) | Face to face counseling sessions, ad hoc telephone counseling; | NR | Continuous availability of ad hoc telephone counseling; | Five sessions of individual and family counseling within 3 months; (some face-to- face ad hoc counseling in Australia) | Yes | Scheduled counseling sessions | Yes (main focus of intervention) |

| Author, Year (Quality Score) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|--|---|--|---|--|--|--|
| Mittelman, 2006 (1); Mittelman, 2004 (2); Mittelman, 2004 (3); Roth, 2005 (4); (n=406) (good) | Provided resource information and referrals for auxiliary help, financial planning, and management of patient behavior problems. Each caregiver in the intervention group had access to all the interventions, and was provided with support for an unlimited time. | No | No | NR | Resource information & help upon request; did not receive formal counseling sessions, and generally did not have contact with the intervention counselors. | Caregivers in the intervention group were able to keep their spouses at home longer than caregivers in the usual care control group (hazard ratio 0.714, p=0.015), (median time difference: 585 days). Patients whose spouses received the intervention experienced a 28.3% reduction in the rate of nursing home placement compared with usual care controls (hazard ratio = 0.717 p= 0.025); Frequency of behavior problems significantly increased over time, but no difference between groups in the pattern of change over a 4-year period. |
| Mittelman, 2008 (1); Brodsky, 2009 (2); (n=158 dyads) (need quality rating) | resource information, help in an emergency, and other routine services; | Patients were examined and tested by a health care professional at each FU visit in the first yr. Adjustment: No; a clinician assessed pt response to donepezil at 3-mo FU and could increase dose to 10mg if necessary; | No | NR | Resource information, help in an emergency, and routine services, but not formal structured counseling sessions. | Over a mean of 5.4 years (SD: 2.4), there were no differences in NH placement or mortality by intervention group; |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals; withdrawals due to adverse events |
|--|---|--|-------------------|---|--|--|
| Mittelman, 2006 (1); Mittelman, 2004 (2); Mittelman, 2004 (3); Roth, 2005 (4); (n=406) (good) | NR | Improvements in caregivers' satisfaction with social support, response to patient behavior problems, and symptoms of depression collectively accounted for 61.2% of the intervention's beneficial impact on placement ($p=0.406$); significantly fewer symptoms of depression ($p<0.05$) in CM, 161 wks (3.1 yrs); significantly lower appraisals ($p=.037$); Significant positive effects on number of support persons ($p=.01$), amount of caregiving assistance received ($p=.0002$), and caregivers' ratings of satisfaction with their social support networks ($p<.0001$); effects of change in satisfaction with social support were significant predictors of both change in stress appraisals ($p<.0001$) and change in depression ($p<.0001$). | NR | Screen: NR; Eligible: NR, Enrolled 406; Intervention (n=203), Control (n=203) | Unclear | NR |
| Mittelman, 2008 (1); Brodaty, 2009 (2); (n=158 dyads) (need quality rating) | NR | Symptoms of depression decreased for treatment caregivers and increased for control caregivers at 6 mo, with the trend continuing over 2 yrs of FU (0.031). | NR | Screened: 169 dyads; Eligible/enrolled: 158 dyads; Intervention: 79; Control: 79. | At 2 years - withdrawn: (intervention 13, control 19); lost to FU (intervention 26, control 18); analyzed overall: 158; | Total withdrawals 22; withdrawals due to adverse events: NR |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If Yes, include)? |
|---|---|--|---|--|---|---|
| Newcomer, 1999 (1); Newcomer, 1999 (2); Newcomer, 1999 (3); Miller, 1999, (4); (n= 8,138) (poor) | Effects of the Medicare Alzheimer's Disease Demonstration (MADDE) on: 1- Caregiver Burden and Depression; 2- Use of Community-based Services; 3- Medicare Expenditures; 4- Nursing Home Entry; | (1, 2): received a baseline assessment and at least one semi-annual reassessment within the study period of 36 months; (3): participants who received their health care through Medicare FFS ; (4): those who remained in the program >30 days after enrollment; | no informal caregiver at baseline; already receiving case management services; | Demonstration Project, randomized design Duration up to 3 years (project ended Nov 31, 1994) | Mean age: 78.9 yrs; Female: 61.3%; Race/ethnicity: White/non-Hispanic 87.3% | Alzheimer's Comorbidities: NR |
| Vickrey, 2006; Duru, 2009; (n=408 dyads) good | To test the effectiveness of a dementia guideline— based disease management program on quality of care and outcomes for patients with dementia. | Age 65 yrs or older, enrolled in Medicare (either fee-for-service or managed care plans), had a dementia diagnosis, and had an informal caregiver at least 18 years of age; Clinic inclusion criterion: primary care clinics; | NR | Cluster RCT Duration: 12 months | Pt mean age: 80; Female: 55%; Caregiver Mean age: 66; Female caregivers: 69%; Lives with pt: 70% | Dementia Comorbidities: NR |

| Author, Year (Quality Score) | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if Yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager |
|---|--|--|--|--|--|---|--|
| Newcomer, 1999 (1); Newcomer, 1999 (2); Newcomer, 1999 (3); Miller, 1999, (4); (n= 8,138) (poor) | Caregiver burden; Pt with AD at high risk for nursing home placement; | Medicare (Medicaid clients excluded) | NR | Model A sites (with one exception) and all Model B sites employed social workers as case managers; Illinois CMs were nurses. | Two case management models; differed by case manager-to-client ratios & service expenditure ceilings per month; Model A: target case manager-to-client ratio of 1:100; Model B: target case manager-to-client ratio 1:30; support services: caregiver education, training, caregiver support groups, mental health & counseling services, transportation to education and support groups. Community services: chore, personal care, companion, & adult day care; | NR | NR |
| Vickrey, 2006; Duru, 2009; (n=408 dyads) good | burden of AD disease | Approximately 77% were in Medicare managed care settings, with the remainder in Medicare fee-for-service arrangements. | Approximately 77% were in Medicare managed care settings, with the remainder in Medicare fee-for-service arrangements. | NR for healthcare organization CM (main CM); Community agency– based dementia care managers were primarily social workers. | Care managers performed a structured home assessment, initiated a care plan, and provided ongoing followup as needed, with in-home reassessments every 6 months; | Formal training in the use of the Internet-based care management software used in the study (community-based CMs received joint training) | unclear (within the healthcare organization) |

| Author, Year (Quality Score) | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] |
|---|--|--|--|---|--|--|---|
| Newcomer, 1999 (1); Newcomer, 1999 (2); Newcomer, 1999 (3); Miller, 1999, (4); (n= 8,138) (poor) | NR | Model A: CM-to- client ratio 1:100; Model B: CM-to- client ratio 1:30 | NR | NR | Formal assessments. | Caregiver education and training. | Education and support groups. |
| Vickrey, 2006; Duru, 2009; (n=408 dyads) good | home visits and phone; | each full-time care manager = approximately 50 patient/caregiver dyads | Initial in-home assessment (77% received an initial visit); ongoing followup by phone as needed (calls every 30 days on average; average of 15/yr, median 12); in-home reassessments every 6 months (55% had a formal reassessment - median, 7 months; range, 4-16 months). Median number of assessment and reassessment visits was 2. | Home | Structured home assessment, reassessments every 6 months | Caregiver education: interactive educational seminars on relevant care issues such as the evaluation of acute behavior changes | CM collaborated with the caregiver to prioritize problem areas and teach problem-solving skills; |

| Author, Year (Quality Score) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|---|--|--|--|--|--|---|
| Newcomer, 1999 (1); Newcomer, 1999 (2); Newcomer, 1999 (3); Miller, 1999, (4); (n= 8,138) (poor) | Purpose of demonstration project. | Health status monitoring while in adult day care. NR for adjustment. | No | NR | Usual care, which generally at the time of enrollment, did not include CM services. | At 6 mo, less than a one-point difference between treatment and controls for burden on a 32-point scale (mean scores of 14.4 vs. 14.9, $p < .05$), no statistically significant difference in other periods; less than half a point difference between treatment and controls for depression on a 15-point scale at 18 and 24 mo (mean scores of 4.17 vs. 4.53, and 4.06 vs. 4.36, $p < .05$), no statistically significant difference in other periods; |
| Vickrey, 2006; Duru, 2009; (n=408 dyads) good | Yes, initiated care plan actions, and sent a summary to the primary care physician and other designated providers, 3 community agencies collaborated to provide specific care services (e.g., access to respite care). | NR | Yes, a physician champion was established within each healthcare organization; The care manager sent an assessment summary, a problem list, and selected recommendations to the patient's PCP. | An Internet-based care management software system was used for care planning and coordination (it included structured assessment, algorithms linking specific care management actions to assessment results, and inter organization care coordination and referral protocols); | Patients, caregivers, & providers were not offered study interventions; patients received care as usual; | Participants who received the intervention had higher care quality on 21 of 23 guidelines ($P < 0.013$); Higher proportions of intervention participants received community agency assistance ($P < 0.03$); Patient health-related QOL, overall quality of patient care, caregiving quality, social support, and level of unmet caregiving assistance needs were better for participants in the intervention group than for those in the usual care group ($P < 0.05$); A higher proportion in the intervention group were taking a cholinesterase inhibitor at followup ($P = 0.032$); No significant difference in caregiver health-related QOL between the 2 groups; |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals; withdrawals due to adverse events |
|---|--|--|---------------------------|--|---|---|
| Newcomer, 1999 (1); Newcomer, 1999 (2); Newcomer, 1999 (3); Miller, 1999, (4); (n= 8,138) (poor) | (2): Intervention group was at least twice as likely as control group to be using any of the four community-based services; No consistent differences between demonstration models; (3): For demonstration sites separately and combined, there was a tendency toward reduced expenditures observed for the treatment group; in two sites, differences were or approached statistical significance for expenditures averaged over 3 years; expenditure reductions approached budget neutrality with program costs in two sites. (4):No difference on permanent nursing home entry rates for intervention | NR | NR | (1, 2): 8,138 received a baseline assessment at enrollment; Eligible for analyses (n=5,307), (excluded:189 did have an informal caregiver at baseline, 2,642 died, were placed in nursing home, withdrew, or changed caregiver prior to second assessment period); (3): eligible for analysis: (n=5,649); (4): eligible for analysis: (n=8,095); | (1,2): 36 % of the initial sample were residing in the community and received a 36-month reassessment; (4): attrition within 30 days (3.5%): 97 died, 160 entered a nursing home, 35 dropped out; loss-to-FU 811 | NR |
| Vickrey, 2006; Duru, 2009; (n=408 dyads) good | No significant differences in the mean monthly cost of healthcare and caregiving services for intervention versus usual care patients using the societal perspective or the payer perspective (and total costs did not differ for patients enrolled in managed Medicare versus fee-for-service Medicare); No significant differences in inpatient or out-patient utilization between the 2 study groups at followup; | Significantly higher mean percentage in the intervention group than in the usual care group (63.9% vs. 32.9%), adjusted difference, 30.1% [95% CI, 25.2% to 34.9%] P <0.001; | NR | 1043 patients initially identified; 91 were ineligible, 308 declined to participate, and 236 did not respond; total enrolled (pt/caregiver dyads) 238 in the intervention group and 170 in the usual care group | 407 had complete utilization data at baseline; survey response rates = 88% at 12 months and 82% at 18 months, excluding 32 deaths in the intervention group and 26 deaths in the usual care group. Analyzed - main analysis; 296 of 408 enrolled; sensitivity analysis;354 patients who completed at least 1 followup survey and for 260 patients who survived for the entire study period and completed surveys at both 12 months and 18 months. | NR |

Appendix K. Evidence Tables: Case Management for Congestive Heart Failure

| Author, Year | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Crossover); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific co-morbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) |
|---------------|--|---|--|---|--|---|---|
| DeBusk, 2004 | To determine whether a telephone-mediated nurse care management program for heart failure reduced the rate of rehospitalization for heart failure and for all causes over a 1-year period. | Hospitalized between 5/1998-10/2000 in one of five medical centers with provisional diagnosis of heart failure (HF); new-onset or worsening HF on the basis of 1) shortness of breath 2) ≥ 1 corroborating clinical sign or radiologic abnormality consistent with HF. | Scheduled for coronary artery bypass or valvular surgery; cardiac surgery in the preceding 8 weeks; serum creatinine >5 mg/dL; dialysis or awaiting renal transplant; pulmonary disease requiring home oxygen; other disease(s) expected to result in death within 1 year; cognitive mental deficits, substance abuse or severe psychiatric disorders; expected to move from the area within 1 year. | RCT, intervention for 1 year | Age: Mean (SD) 72 (11) years; Median NR; Ranges < 60 (15%), 60-70 (23%), 70-80 (39%), >80 (24%); Female 48%; Race: White (83.5%), Black (5.8%), Asian (17.3%) Hispanic (3%) American Indian (5.8%) SES: NR | Heart Failure (severity at baseline: New York Heart Association (NYHA) class I or II (49%), class III or IV (51%)) 1) Hypertension (63%); Coronary artery disease (51%) 2) NR | Disease severity; Number of comorbidities. |
| Jaarsma, 2008 | To examine the effects of a nurse-led disease management program at two levels of intensity on the combined endpoints of death and readmission to the hospital. | Admitted to one of 17 study hospitals with symptoms of HF, NYHA class II to IV, age 18 years or older, evidence of structural underlying heart disease on imaging, either preserved or impaired left ventricular ejection fraction (LVEF), stable on standard medications for HF prior to hospital discharge; | Concurrent inclusion in another study or HF clinic, inability to complete the questionnaires, invasive procedure or cardiac surgery intervention performed within the last 6 months or planned to be performed within the next 3 months, ongoing evaluation for heart transplantation, and inability or unwillingness to give informed consent. | Multicenter randomized trial with blinded endpoint evaluation | Mean age: 71 \pm 11 Female: 38% Living alone: 39% NYHA functional class: II 50% III 46% IV 4% | Heart failure 1) HTN 43%; AFib 36% ; DM 28% Stroke 10% ; COPD 43% 2) NR | Multiple comorbidities, severity of disease (all patients NYHA Class II-IV) |

| Author, Year | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Did case manager have the ability to adjust medications? (If yes, describe) | Primary Location of Case Manager |
|---------------------|--|--|---|--|---|---|---|
| DeBusk, 2004 | Kaiser Permanente | Yes; Kaiser Permanente California | Nurses | In addition to usual care, intervention group received a standardized, telephone-mediated intervention which included the following elements: initial educational session, including a videotape; baseline telephone counseling session; nurse-initiated follow-up telephone contacts; pharmacologic management; and nurse-initiated communication with physicians. | NR | Yes; could initiate and regulate HF meds according to study protocol (based on published treatment guidelines). | Unclear (possibly at Stanford University) |
| Jaarsma, 2008 | NR | NR | Nurse specializing in management of patients with heart failure | Two levels of intervention (basic and intensive support); all intervention patients received: 1) input visit by HF nurse for education and support 2) OP cardiology visit <2 mo after discharge and then every 6 months. 1) Basic support: additional visits to the HF nurse at the outpatient clinic, and instructions to contact the nurse if there was any change in condition. 2) Intensive support: similar intervention but monthly contact with the nurse; weekly telephone contacts and home visit by the HF nurse in the first mo; telephone calls, 2 home visits, and multidisciplinary advice given by a physiotherapist, dietician, and social worker. | All nurses were trained to increase the self-efficacy of patients. | No. | Nurses in cardiology outpatient clinic. |

| Author, Year | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support (e.g., motivational interviews, coaching setting) |
|---------------------|--|-----------------|--|---|--------------------------------|---|---|
| DeBusk, 2004 | Telephone, after initial face-to-face visit. | NR | Initial 1-hour educational session in person; a 45-minute baseline telephone counseling session within 1 week of randomization; follow-up telephone contacts scheduled at weekly intervals for 6 weeks; biweekly for 8 weeks; monthly for 3 months; bimonthly for 6 months; and as needed. | Initial 1-hour educational session with a nurse occurred in the patient's medical center. | Yes | Initial 1-hour educational session with a nurse occurred in the patient's medical center. | In the initial educational session, patients received educational materials, including methods for self-monitoring of symptoms, body weight, and medications. |
| Jaarsma, 2008 | Home visits and telephone calls, as well as HF nurse clinic visits in both basic and intensive support groups. | NR | All patients were seen at an outpatient cardiology clinic within 2 months of discharge and every 6 months. 1) Basic support: scheduled for additional visits in HF clinic (estimated time investment of nurses was 20 hours per patient) 2) Intensive support: more contacts with the HF nurse than basic support plus weekly telephone calls and a home visit in 1st month post-discharge, plus 2 additional home visits (estimated time of nurses was 40 hours per patient). | Initial in-pt visit, HF clinic visits, and home visits; | Yes | Patients given a diary, brochures on HF and its management, and intensive education inpatient prior to discharge. | HF nurses for both support groups trained to increase patient self-efficacy in their interactions with patients. |

| Author, Year | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|---------------------|---|---|--|--------------------------------|---|---|---|
| DeBusk, 2004 | Intervention did not include discharge planning or social work involvement. | Telephone contacts with patients to monitor medications, laboratory assessments, symptoms, and other medical problems; yes; could initiate and regulate HF meds according to study protocol (based on published treatment guidelines) | Nurse-initiated communication with physicians about patients' current medical status was maintained and specific management problems were addressed. | NR | Nurse care managers spent an average of 9 hours per patient coordinating the treatment plan with patients and physicians during the first year. | Usual care provided by their primary healthcare providers included instruction on diet, drug adherence, physical activity, and response to changing symptoms. | 1) Proportional Hazard (95% CI) for composite outcome: Cardiac cause: 0.85 (0.64-1.14), $P > 0.2$; Any cause: 0.87 (0.69-1.08), $P > 0.2$ 2) Proportion of patients receiving angiotensin- converting enzyme inhibitors or angiotensin-receptor blockers (% treatment group vs. % usual care group): 90% vs. 75%; at 12 months: 90% vs. 88%. 3) Proportion of patients receiving β - blockers: (% treatment group vs. % usual care group): baseline: 38% vs. 32%; 12 months: 50% vs. 46%. |
| Jaarsma, 2008 | Multidisciplinary advice was given to patients by a physiotherapist, dietician, and social worker in the intensive support group. | Patients examined at hospital discharge and for 18 months thereafter (this is not otherwise specifically described); no adjustment. | No. Patient coordinated visits were all to specialized HF clinic. | NR | None | Patients in the control group did not receive any treatment other than standard management by their cardiologist. | Death outcomes, control vs. basic support vs. intensive support; n (%): All causes: 99 (29) vs. 90 (27) vs. 83 (24) Reduction in mortality of 12% for basic (HR: 0.88 [95% CI 0.66 to 1.18; $p=0.39$]) and 19% for intensive support compared to control groups (HR: 0.81 [95% CI 0.60 to 1.08; $p=0.15$]); for both groups vs. control, HR 0.85 (95% CI 0.66 to 1.08, $p=0.18$) |

| Author, Year | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|---------------|---|-------------------------------------|--|--|--|--|---|
| DeBusk, 2004 | Proportional Hazard (95% CI) for time to first rehospitalization: Heart failure: 0.84 (0.56-1.25), P>0.2; Any cause: 0.98 (0.76-1.27), P>0.2 Mean number of emergency department visits in the treatment and usual care groups during the first year of followup: 3.2 (median, 2.0) vs. 3.5 (median, 2.0) | NR | No harms of intervention reported. | Screened:2786; Eligible: 835 Enrolled:462 intervention (n=228); usual care (n=234) | First year follow-up: Withdrawal 3% (intervention 8, usual care 15); Died 11% (intervention 21, usual care 29) | No withdrawals listed due to adverse outcomes. | |
| Jaarsma, 2008 | 1) Hospitalization Incidence rate: Intensive support group= 0.31, control group = 0.29 per follow up year; incidence rate ratio: 1.07 (95% CI 0.83 to 1.37; p=0.62) 2) Median duration of admission (days), intensive support vs. basic support vs. control: 9.5 (p=0.29) vs. 8.0 (p=0.01) vs. 12.0 3) Median number of days lost, number (25th and 75th percentiles): control: 12 (0.00, 173) basic support: 9 (0.00, 88.0; p=0.81) intensive support: 7.5 (0.00, 86.5; p=0.49) | NR | None reported due to the intervention. | 2957 screened/1049 eligible/1049 enrolled; control (n=348), basic support (n=348), intensive support (n=353) | Control: 9 died before discharge, 1 crossed over to basic support Basic support: 8 died before hospital discharge, 1 crossed over to intensive support Intensive control: 9 died before discharge/ 0 lost to follow-up/1023 analyzed | 27 total withdrawals/none due to adverse outcome of intervention | Substantial difference in contacts with the study cardiologists and the specially trained nurses in all 3 groups compared with the planned protocol: 33% more visits to the cardiologist for the control group; 40% more visits or telephone calls for basic support; and 10% more visits or telephone calls for intensive support. |

| Author, Year | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) |
|---------------|---|---|---|--|--|--|--|
| Kasper, 2002 | To determine whether a multidisciplinary outpatient management program decreases CHF hospital readmissions and mortality over a 6-month period. | English-speaking, admitted at one of two study hospitals with a primary diagnosis of NYHA class III/IV CHF, one or more risk factors for CHF readmission (age >70 years, LVEF <35%, CHF hospital admission in the previous year, ischemic cardiomyopathy, peripheral edema at discharge, <3 kg of weight loss in hospital, PVD, or hemodynamic findings (during the index admission) of pulmonary capillary wedge pressure>25 mm, cardiac index <2.0, systolic BP>180, diastolic BP>100). | Valvular heart disease requiring surgical correction, substance abuse, peripartum cardiomyopathy with left ventricular outflow tract obstruction, restrictive cardiomyopathy, constrictive pericarditis, psychiatric disease or dementia, concurrent noncardiac illness likely to cause repeat hospital admissions, heart transplantation likely to occur within 6 months, uncorrected thyroid disease, serum creatinine >265 picomoles/L, long term IV therapy at home, cardiac surgery or MI during index admission, active participation in another research trial, unwilling to provide informed consent, residence in a nursing home, rehab facility, or outside the service area. | RCT, intervention duration 6 months | Age (yrs): Mean (62), Median (63.5), Range (25-88); Male: 60% Race: White 64%, Black 35%; NYHA class (at time of randomization): II: 36%, III: 59% | Chronic heart failure 1) HTN: 67%; DM: 40% 2) NR | Severity of disease (eligible patients all NYHA class III or IV at hospital admission), majority with 1-2 comorbidities, patients with moderate impairment in functional capacity and quality of life. |
| Laramée, 2003 | To test the effect of hospital-based nurse case management on readmission rate in a heterogeneous CHF population. The case-managed group would exhibit a 50% lower 90-day readmission rate than the usual care group and maintain equivalent or better adherence to plan of care. | Clinical signs and symptoms for CHF and either moderate-to-severe left ventricular dysfunction or radiographic evidence of pulmonary congestion and symptomatic improvement following diuresis; at risk for early readmission (one or more of the following: history of CHF, knowledge deficits of treatment plan or disease process, potential or ongoing lack of adherence to treatment plan, previous CHF hospital admission, living alone and four or more hospitalizations in the past 5 years). | Discharge to a long-term care facility; planned cardiac surgery; cognitive impairment; anticipated survival of fewer than 3 months; long-term hemodialysis. | RCT; 12 week intervention; enrollment period July 5, 1999, through April 30, 2001. | Mean age (SD): 71 (12); Median and Average age: NR; Female 46%; Race NR; Income <\$10,000: 24%; | Congestive Heart Failure (CHF) 1) Hypertension (74%); Diabetes (43%); COPD (23%); Peripheral Vascular Disease (15%); Hyperlipidemia (58%); Obesity (48%) 2) NR | Multiple comorbidities and risk for early hospital re-admission; |

| Author, Year | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Did case manager have the ability to adjust medications? (If yes, describe) | Primary Location of Case Manager |
|-------------------------|--|--|---|---|--|---|--|
| Kasper, 2002 | NR | NR | Intervention team included: telephone nurse coordinator, CHF nurse, CHF cardiologist and the patient's primary physician. | Telephone nurse coordinator: followup phone calls with set script within 72 hours of discharge, weekly for 1 month, twice in 2nd month, then monthly; followed up problems as clinically indicated, but did not adjust meds; CHF nurses: monthly followup, usually in CHF clinic; followed a prespecified algorithm for med adjustment, diet, and exercise. | NR | CHF nurses adjusted medications under the directions of the CHF cardiologists following a prespecified algorithm. | Telephone nurse located in local call center; CHF nurses located at CHF clinics. |
| Laramee, 2003 | Heterogeneous insurance types | No | CHF case manager (CM) with a master's degree and 18 years of experience in critical care and cardiology. | Four major components: early discharge planning, patient and family CHF education, 12 weeks of telephone follow-up, and promotion of optimal CHF medications. | All case management completed by one CHF case manager. | No; (however the CM monitored CHF meds and dosages and made recommendations to healthcare providers based on consensus guidelines). | Hospital-based. |

| Author, Year | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self- Management Support (e.g., motivational interviews, coaching setting) |
|-------------------------|--|--|---|--|---|--|---|
| Kasper, 2002 | Telephone calls and CHF clinic visits | NR | Phone calls by nurse coordinator: one within 72 hours of discharge, weekly for one month, twice in second month and monthly thereafter (average: 9.5 calls per patient); CHF nurse visits at least monthly (8.5 visits per patient). | CHF nurse visits monthly, usually at clinic, sometimes at patient's home. | CHF nurse followed a treatment plan designed by the cardiologists. | Patient received list of correct medications, list of dietary and physical activity recommendations, and "patient education material" (not otherwise described). | NR |
| Laramée, 2003 | 12 week telephone follow-up. | 65-89 at any given time (included study and nonstudy patients) | Phone calls to pt and/or family members at 1-3 days after discharge, and at weeks 1, 2, 3, 4, 6, 8, 10, and 12 (calls ranged from 5 to 45 minutes). | All face-to-face time occurred while the pt was hospitalized. | Developed the plan of care with patient and family. | Described as a major focus whenever in contact with pt or family. | Yes (described as a major focus when in contact with pt or family) |

| Author, Year | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|---------------|--|--|---|-------------------------|---|---|---|
| Kasper, 2002 | Patients with limited financial resources were provided, if needed, a scale, a 3-g sodium "Meals on Wheels" diet, medications, a pill sorter, transportation to the clinic, and a telephone; | CHF nurse notified primary physician of abnormal lab values; CHF nurses adjusted medications under the directions of the CHF cardiologists following a prespecified algorithm. | Yes. Primary physicians approved of pt participation, as well treatment plan; they managed all problems not related to CHF and received regular updates from the CHF nurses; and were notified of abnormal laboratory values. | NR | None | Care by primary physicians; baseline therapeutic plan designed by CHF cardiologist documented in patient's chart without further intervention; | Death: non-intervention:13, CM: 7, p=0.14. 1) Admissions for CHF: non-CM: 59 admissions among 35 patients; CM: 43 admissions among 26 patients; p=0.09 2) QOL scores MLHF change from baseline: CM total mean: 35.7, intervention total median: 33, 25th to 75th %: 14-52; control total mean: 45.3, total median: 51, 25th to 75th %: 22-64, p=0.01 3) Duke activity status change from baseline: CM score mean: 1.1, score median: 1.0; control score mean 0.8, median: 1.0, p=0.44 |
| Laramée, 2003 | Responsible for in-hospital consultations and discharge planning; made arrangements for additional services or support after discharge as needed. | Yes (monitoring of CHF meds and dosages while hospitalized and after discharge); No to adjustment. | CM submitted progress reports to the PCP while the pt was in the hospital; After discharge the physician was informed of the pt's study participation and outlined the case management program. At study completion, the PCP received a letter that summarized the patient's condition and progress in the program. At week 6, if the patient was not taking an ACEI or ARB and a BB was appropriate or if he or she was not at target doses, a recommendation letter was sent to the responsible physician as a courtesy reminder. | NR | The CM was available to the pt and family as a resource Monday-Friday during daytime hours. | Usual care group received standard care, typical of a tertiary care hospital, and all conventional treatments requested by the attending physician. Inpatient treatments included social service evaluation (25% for usual care group), dietary consultation (15% usual care), PT/OT (17% usual care), medication and CHF education by staff nurses, and any other hospital services. Post-discharge care conducted by the patient's own local physician. | Patients in the intervention group were significantly more satisfied with their care in 13 of 16 items than the usual care group (P< .01). All items that measured care instructions and recovering at home were significantly better in the intervention group (P< .01); Mean (intervention vs. control), 1-5 scale: Hospital care: 4.2 vs. 4.0, p=0.003; Hospital discharge: 4.3 vs. 4.0, p<0.001; Care instructions: 4.0 vs. 3.4, p<0.001; recovering at home: 4.4 vs. 3.9, p<0.001; Total score: 4.2 vs. 3.8, p<0.001. Medication Use and Target Dose Advancement, Number (%) of patients in Intervention vs. Control groups: 1) @ discharge: Taking ACEIs or ARBs: 121 (86%) vs. 115 (79%), p=0.16; Taking BBs: 91 (65%) vs. 89 (61%), p=0.63; Target dose of ACEI or ARB: 74 (64%) vs. 56 (51%), p=0.08; Target dose of BBs: 28 (33%) vs. 18 (23%), p=0.17 @ 12 weeks: Taking ACEIs or ARBs: 108 (84%) vs. 90 (80%), p=0.40; Taking BBs: 89 (70%) vs. 70 (62%), p=0.22; Target dose of ACEI or ARB: 64 (63%) vs. 42 (49%), p=0.08; Target dose of BBs: 27 (32%) vs. 18 (29%), p=0.72 |

| Author, Year | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|---------------|--|--|--|--|---|--|-------|
| Kasper, 2002 | Admissions for CHF: non-intervention: 59 admissions among 35 patients; intervention: 43 admissions among 26 patients; (p=0.09) | 1) CM group more likely to be prescribed target doses of vasodilators (74 of 80 patients vs. 43 of 71 patients, p <0.001) 2) Percentage of patients compliant with diet recommendations were significantly better in the CM group (65 of 94 patients vs. 38 of 85 patients, p=0.002) 3) Patients more likely to be at their goal weight compared with non-CM group (47 of 94 vs. 17 of 85, p=0.001). | No harms reported due to the intervention. | 1452 patients screened/200 eligible/200 enrolled, intervention (n=102), nonintervention (n=98) | 0 withdrawn/ 0 lost to followup/ 200 analyzed | 0 withdrawals, 0 due to adverse events | NR |
| Laramee, 2003 | 1) Length of stay, CM vs. control: Mean (SD) days: 5.5 (3.5) vs. 6.4 (5.2), p=0.10; Median (IQR) days: 5 (3-7) vs. 5 (3-7), p=0.35. 2) Readmissions, CM vs. control, Number (%): 90- day: 49 (37%) vs. 46 (37%), p>0.99; CHF: 18 (14%) vs. 21 (17%), p= 0.49; Cardiac: 15 (11%) vs. 10 (8%), p=0.40; Other: 24 (18%) vs. 23 (18%), p>0.99. 3) Readmission days in hospital, CM vs. control: mean (SD): 6.9 (6.5) vs. 9.5 (9.8), p=0.15; median (interquartile range): 5 (2-8) vs. 7 (2-10), p=0.37. 4) Predictors of readmission were increasing age (P<.01), NYHA class at discharge (P<.01), chronic renal failure (P=.01), diabetes (P=.04), and COPD (P=.04). 5) CM had significantly fewer CHF readmissions than the usual care for patients admitted initially with weight gain (n=19, P=.03) or chronic renal failure (n=9, P=.05) 6) Cost (\$), CM vs. control: Initial admission, mean: 16,119 vs. 19,081, p=0.18; Total readmission, mean: 5,253 vs. 5,163, p=0.96; Total inpatient, mean: 21,373 vs. 24,245, p=0.31; Total outpatient, mean: 1,552 vs. 1,307, p=0.28; Total, mean: 23,054 vs. 25,536, p=0.39; Patients readmitted at least once; Total readmission, mean: 15,417 vs. 16,379, p=0.82. | Adherence scores (1- never to 5- always): 1) 4-weeks (CM vs. control): Weigh self daily: 4.7 vs. 3.2, p<0.001; Check ankles and feet for swelling: 4.9 vs. 4.5, p=0.002; Follow fluid recommendation: 5.0 vs. 4.6, p=0.006; Follow low salt diet: 4.9 vs. 4.6, p<0.001; Take medications: 5.0 vs. 4.9, p=0.04 2) 12 weeks CM vs. control): Weigh self daily: 4.6 vs. 3.1, p<0.001; Check ankles and feet for swelling: 4.8 vs. 4.6, p=0.02; Follow fluid recommendation: 5.0 vs. 4.6, p=0.003; Follow low salt diet: 4.8 vs. 4.4, p<0.001; Take medications: 5.0 vs. 4.9, p=0.04 | NR | Screened: 589; Eligible: 454; Enrolled : 287; intervention (n=141), control (n=146); | Attrition due to withdrawal/death/lost to FU: intervention 19, usual care 34. | Total withdrawals: 9 (usual care); withdrawals due to adverse events: NR | NR |

| Author, Year | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific comorbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) |
|--------------------|---|--|--|---|--|---|---|
| Peters-Klimm, 2010 | To explore whether a primary-care based CM intervention for HF pts would improve health-related QOL, HF self care, and pt-reported QOC. | Age >= 40 yrs; objective left ventricular CHF; EF = or < 45%; NYHA I with hospital admission because of CHF within the last 24 months or NYHA II-IV; stable disease at enrollment; capable to give informed consent. | Participation in another clinical trial within the last 30 days; residency in a nursing home; primary valvular heart disease with relevant hemodynamic effects, hypertrophic obstructive/restrictive cardiomyopathy, status post/pre organ transplant, acute LV failure, life expectancy of < 2 years due to other illness, impaired mental state; drug abuse. | Prospective, two-arm RCT, pt enrollment Dec 2006 and Jan 2007; 1-year intervention. | Age: Median and Range NR, Mean (SD) 70 (10); Male: 73%; Race: NR; SES: lower social class (according to modified German Winkler-index) 31% | Chronic congestive heart failure 1) AFib 27%; ; PAD 17%; Cerebrovascular disease 19%; COPD 26%; Diabetes 34%; HTN 79%;; Dyslipidemia 70%; 2) Depression 20% | CHF; Likely to have additional comorbidities and polypharmacy; |
| Rich, 1993 | To test the effectiveness of a multidisciplinary approach to prevent hospital readmission of elderly patients with CHF <i>A priori</i> : up to 50% of readmissions are potentially preventable | >70 years of age, diagnosis of congestive heart failure while hospitalized, with one [moderate] or more [high] risk factors for rehospitalization (> 3 hospitalizations in last 5 yrs, prior history of CHF, cholesterol < 150 mg dl, right bundle-branch block on admission). | Death prior to discharge, residence outside catchment area, planned discharge to nursing home or chronic care facility, terminal malignancy, severe mental incapacity or psychiatric illness. | RCT; 90 day followup (<i>duration of intervention unclear</i>) | Age: treatment group 80 (+/-6.3) yrs, control 77.3 (+/-6.1) yrs p=0.04 Male: 41%; Race: White 52%; SES: NR | Congestive Heart Failure 1) Diabetes: 31% HTN 66% 2) Coexisting mental illness not reported | Elderly; Moderate (n=61) to high (n=37) risk of rehospitalization |
| Rich, 1995 | To assess the effect of a nurse-directed, multidisciplinary intervention on rates of readmission, quality of life, and costs of care for elderly patients with CHF. | >70 years of age admitted with CHF and at risk for readmission (prior history of HF, or >3 hospitalizations for any reason in last 5 yrs, or CHF precipitated by acute MI, or uncontrolled HTN (systolic >200 mm Hg or diastolic >105 mm Hg). | Residence outside catchment area, planned discharge to a long-term-care facility, severe dementia or other serious psychiatric illness, anticipated survival of less than 3 months, refusal to participate by either the patient or the physician, and logistic or discretionary reasons (including participation in pilot study - Rich 1993) | RCT, 90 day followup (<i>duration of intervention unclear</i>) | Age: Control (78.4+/-6.1), treatment (80.1+/-5.9), p=0.02; Female: 64%; Nonwhite race:56%; Education greater than 8th grade: Control 48%; treatment 35%, p = 0.03; Married: 35%; Living alone: 43% | Congestive Heart Failure 1) HTN:76%; DM: 28% 2) NR | Elderly; at risk for early hospital readmission |

| Author, Year | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Did case manager have the ability to adjust medications? (If yes, describe) | Primary Location of Case Manager |
|--------------------|---|---|---|--|--|---|----------------------------------|
| Peters-Klimm, 2010 | Study included GP practices (in Germany) that took all insurance types. | No | Doctor's assistants (DAs), equivalent to a nursing role; mean years of work experience (SD): 10.8 (9.1) | Regular monitoring of symptoms and medication adherence via telephone monitoring along with 3 home visits; direct feedback from CM given to employing GP. | DA's participated in the study's case management workshops; duration of training was 1.5 days. | No. Able to inform GP upon urgency. | Embedded in primary care clinic. |
| Rich, 1993 | NR | NR | Experienced cardiovascular research nurse. | <p>Patient education, medication monitoring, post-hospital coordination with home health nurse, telephone follow up.</p> <p><i>Note: Study intervention was multidisciplinary and also included pre-discharge medication review by geriatric cardiologist, and in-hospital social worker, dietician, and home care team involvement.</i></p> | NR | No | NR |
| Rich, 1995 | NR | NR | Experienced cardiovascular research nurse. | <p>Pt education, medication monitoring, post-hospital coordination with home health nurse, telephone follow up.</p> <p><i>Note: Study intervention was multidisciplinary and also included pre-discharge medication review by geriatric cardiologist, and in-hospital social worker, dietician, and home care team involvement</i></p> | NR | No | NR |

| Author, Year | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support (e.g., motivational interviews, coaching setting) |
|--------------------|---|--|--|---|--|---|--|
| Peters-Klimm, 2010 | Phone calls every 3-6 weeks and 3 home visits/yr. | NR (there were 31 CMs from 21 practices, with an average of 3.2 intervention pts per practice) | Telephone and home visits: low to medium risk (NYHA I/II): phone call every 6 wks and three home visits during the year; high risk (NYHA III/IV), phone calls every 3 wks and three home visits during the year; Mean durations (SD; range) telephone calls: 10 (5; 2-38)minutes; Mean durations (SD; range) of 3 home visits: 55 (14; 30-120), 53 (16, 18-90) and 51 (17; 21-90) minutes, respectively. Total time per patient (telephone monitoring, travel time, home visits, and reporting) during the 12-month FU: low to medium risk (NYHA I/II); mean (SD) 5.2 (2.0) hours; high risk (NYHA III/IV); mean (SD) 6.7 (2.4) hours. | Initial clinic visit for CM introduction and patient education; 3 home visits/yr. | Yes | Yes | Self-monitoring education and tools provided to patient at first clinic visit. |
| Rich, 1993 | In-hospital, followup by telephone | NR | Daily visits during hospitalization by research nurse, frequency of FU phone calls NR. | In-hospital | Early discharge planning by multi-disciplinary team. | Daily visits during hospitalization by research nurse for disease management education. | Daily visits during hospitalization by research nurse for disease management education; Home-care nurse's role included reinforcing patient teaching. |
| Rich, 1995 | In-hospital, and followup by telephone. | NR | Daily visits during hospitalization by research nurse, frequency of FU phone calls NR; | In-hospital | Early discharge planning by multi-disciplinary team. | Daily visits during hospitalization by research nurse for disease management education. | Daily visits during hospitalization by research nurse for disease management education; <i>Home-care nurse's role included reinforcing patient teaching.</i> |

| Author, Year | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|--------------------|--|--|--|-------------------------|----------------------------|---|--|
| Peters-Klimm, 2010 | NR | Monitoring of symptoms and medication adherence; no adjustment though CM gave GP feedback. | CM (DA) embedded in primary care and employed by the GP. CMs gave feedback (results of pt monitoring) directly to the GPs. | NR | None | Usual care (no CM) from primary physician. | Mean (SD) scores for CM vs. control Baseline: SF-36: physical composite score, 36.4 (11.0) vs. 36.9 (10.1); mental composite score, 45.8 (11.9) vs. 47.6 (12.8); KCCQ overall summary score: 65.4 (22.6) vs. 64.7 (22.7). Followup, Mean (SD), Mean difference [95% CI]: SF-36: physical composite score, 38.0 (8.6) vs. 38.3 (8.6), mean difference, -0.3 [-3.0, 2.5], cohens d=0.04, p=0.857; mental composite score, 46.5 (9.9) vs. 46.6 (9.9), mean difference, -0.1 [-3.4, 3.1], cohens d=0.01, p=0.929; KCCQ, 68.0 (16.9) vs. 66.3 (17.2), mean difference 1.7 [-3.0, 6.4], cohens d=0.10, p=0.477 |
| Rich, 1993 | Discharge summary completed by study nurse and transmitted to home health nurse. | No; No | No | NR | None | All conventional treatments requested by attending physician; (Social-service consultations and home-care referrals were over 30% less frequent among usual care group) | NR |
| Rich, 1995 | Discharge summary completed by study nurse and transmitted to home health nurse; <i>Note: Study intervention was multidisciplinary and also included pre-discharge medication review by geriatric cardiologist, and in-hospital social worker, dietician, and home care team involvement.</i> | No; No | No | NR | None | All conventional treatments requested by attending physician; (included social-service consultations (46%), dietary consultation (49%) and home care after discharge (39%)) | Mean \pm SD Changes in quality of life scores, control vs. intervention: Total QOL change: 11.3 \pm 16.4 vs 22.1 \pm 20.8, +96%, p=0.001; Dyspnea: 3.8 \pm 5.4 vs. 6.8 \pm 7.9, 79%, p=0.01; Fatigue: 2.7 \pm 6.1 vs. 5.4 \pm 5.5, +100%, p=0.01; Emotional function: 1.9 \pm 5.2 vs. 5.6 \pm 7.1, +195%, p=0.001; Environmental mastery: 2.9 \pm 5.0 vs. 4.4 \pm 5.3, +52%, p=0.10 |

| Author, Year | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/ enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|--------------------|---|--|--|--|--|--|--|
| Peters-Klimm, 2010 | NR | Mean (SD) scores for CM vs. control Baseline: EHFSBS: 25.4 (8.4) vs. 25.0 (7.1); PACIC overall: 3.2 (0.9) vs. 3.2 (0.8); PACIC-5a: 3.2 (0.9) vs. 3.2 (0.9) Followup, Mean (SD), Mean difference [95% CI]: EHFSBS: 21.2 (6.4) vs. 24.8 (6.7), mean difference -3.6 [-5.7,-1.6], cohens d=0.55, p=0.001; PACIC overall: 3.8 (0.7) vs. 3.3 (0.7), mean difference 0.5 [0.3,0.7], cohens d=0.72, p=0.000; PACIC-5a: 3.8 (0.7) vs. 3.3 (0.7), mean difference 0.5 [0.3,0.8], cohens d=0.72, p<0.001 | NR | Screened: 10653; Eligible: 256; Enrolled: 199; intervention (n=99), usual care (n=100); | Withdrawal/lost to FU: intervention 12%; usual care 7%; Analyzed overall: 90% | Total withdrawals: 9, 0 due to adverse events. | NR |
| Rich, 1993 | 1) 90-day readmission rate: no significant differences between intervention and control groups or among moderate and high risk groups. 2) Readmission rate (special care vs. usual care): 33.3% vs. 45.7%, NS 3) Hospital days: no significant differences between intervention and control or among moderate and high risk groups. | NR | None reported due to the intervention. | 261 screened/98 eligible/98 enrolled; intervention (n=63), control (n=35) | Number withdrawn and lost to follow-up not specifically reported. 98 analyzed. | NR | 21 patients died during initial hospitalization and were excluded from the analysis. |
| Rich, 1995 | 1) 90-day survival rates without readmission: NSD between CM (64.1%) and control (5.6%), absolute difference, 10.5%, 95% CI -0.9 to +21.9%, percent difference 19.6%, p=0.09) 2) 90- day analysis restricted to survivors of the initial hospitalization: significant difference between CM (66.9%) and control (54.3%) control group (95% CI 1.1-24.1, p=0.04) 3) Readmissions (control vs CM) for any cause:44.4% less for CM group (94 vs 53) p=0.02; for CHF: 56.2% less for CM group (54 vs 24) p=0.04 4) Hospital days (control vs CM): 35.7% fewer for CM group (865 vs 556) p=0.04 5) Costs of readmission in control group greater than CM group by average of \$1058 per patient (\$3236 control group vs. \$2178 treatment group, p=0.03). | NR | No harms reported. | 1306 screened/282 eligible/282 enrolled, intervention (n=142), control (n=140) | 17 patients in control group and 13 patients in the treatment group died. | NR | NR |

| Author, Year | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific comorbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) |
|----------------------|--|--|--|---|--|--|--|
| Riegel Carlson, 2002 | To assess the effectiveness of a standardized telephonic nurse case management intervention in decreasing resource use in patients with chronic HF. Primary hypothesis: HF hospitalization rates would be lower in the CM than in the control groups. Secondary hypotheses: CM intervention would decrease all-cause hospitalization, readmission rates, (for HF and all causes), average number of hospital days (for HF and all causes), and inpatient HF costs at 3 and 6 months. | Hospitalization at one of two hospitals with a confirmed clinical diagnosis of HF as the primary reason for the hospital visit; and spoke either English or Spanish. | Cognitive impairment or psychiatric illness; severe renal failure requiring dialysis; terminal disease; discharge to a long-term care facility; or previous enrollment in an HF disease management program. | RCT, 6 month duration. | Mean age: 74 years Female: 50% Race: NR Primary language: English 72% Spanish 26% Functionally compromised (97% were NYHA class III or IV) | Chronic heart failure 1) HTN: 69%; COPD: 36%; CAD: 65%; CVA: 10%; DM: 42%; PVD: 17%; Renal disease without dialysis: 28%; Thyroid disease: 15% 2) NR | Multiple comorbidities, Spanish-speaking. |
| Riegel, 2006 | <i>A priori hypothesis:</i> Telephone case management would decrease hospitalizations (acute care use) and improve HRQL and depression in Hispanics of Mexican origin with HF. | Hospitalized with a primary or secondary* diagnosis of HF at one of two participating hospitals, self-identified Hispanics, community dwelling and planning to return to the community after hospital discharge (*only if at high risk for a HF hospitalization because of age > 80 years, a high level of comorbid illness, or not being on an ACEI at admission) | History of cognitive impairment, on dialysis, acute MI within the preceding 30 days without established history of chronic HF, serious or terminal condition, major/ uncorrected hearing loss, lack of access to a telephone, or failure to give informed consent. | RCT, duration 6 months, enrollment 2 years | Mean Age: 72.1 (+/- 11) years; Female 54%; Married: 60%; Education: Grade school or less 78%, Insurance: Medicaid 10%, Medicare 60%, No insurance 6%; Annual income <\$15,000: 76%; Speak/read only Spanish: 63%; | Heart failure 1) HTN 79%; COPD 28%; History of MI 28%; Diabetes 59%; Diabetes with end-organ damage 18%; Renal disease (with creatinine >3 mg%) 7% 2) Depression treatment part of intervention. | Language barrier, low annual income, most with Medicare/ Medicaid or indigent care insurance, most with less than high school education. |

| Author, Year | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Did case manager have the ability to adjust medications? (If yes, describe) | Primary Location of Case Manager |
|-------------------------|--|---|--|--|--|---|--|
| Riegel Carlson, 2002 | NR | NR | RN | Telephonic case management by an RN using a decision support software program designed to emphasize factors shown to predict hospitalization in persons with HF (i.e., poor adherence to medication regimens and diet recommendations and lack of knowledge of the signs and symptoms of worsening illness). | The nurses received 10 days of intense training and continuing mentoring in case management thereafter (i.e., 15 one-hour sessions); a total of 95 hours of training was provided each case manager. | NR | Hospital |
| Riegel, 2006 | Insurance: Medicaid 10%; Medicare 60%; HMO 24% No insurance 6% | 23.9% <i>unspecified HMO</i> | Two bilingual/bicultural Mexican-American registered nurses/special training in HF | Telephonic case management by a bilingual/bicultural RN using a decision support software program designed to emphasize factors shown to predict hospitalization in persons with HF (i.e., poor adherence to medication regimens and diet recommendations and lack of knowledge of the signs and symptoms of worsening illness). <i>The intervention was refined to be culturally appropriate, including an emphasis on personalized caring, trust, inclusion of the family, and concrete solutions and problem solving in response to problems with self-care.</i> | NR | No | The nurse case managers were affiliated with the hospital. |

| Author, Year | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self- Management Support (e.g., motivational interviews, coaching setting) |
|-------------------------|--|---|--|--|------------------------------------|--|---|
| Riegel Carlson, 2002 | Telephone | NR | Phone contact within 5 days after hospital discharge and thereafter at a frequency guided by the software and case manager judgment; an average of 17 phone calls at decreasing levels of intensity, length, and frequency over the 6-month follow-up period (median, 14 phone calls; IQR, 11-22 phone calls). Each patient was estimated to have received 16 hours of a case manager's time, most of which was spent counseling the patient over the telephone. | Not included in study. All contact by telephone. | Yes | Calls emphasized patient education; printed educational material mailed to patients monthly. | Yes; calls emphasized monitoring and patient education. |
| Riegel, 2006 | Telephone. | N=69 between 2 case managers but not specifically reported. | Telephone contact within 5 days after hospital discharge and thereafter at a frequency guided by the software and nurse case manager judgment. Patients received an average of 13.5 (SD 5.9; median 13; interquartile range 11–16) telephone contacts and families received an additional 8.4 (SD 6.3; median 7; interquartile range 3–13) telephone contacts over the 6-month intervention period, with most calls early after hospital discharge. | None Intervention was intended to be by telephone only. | Yes | Calls emphasized patient education; Printed educational material in the desired language was mailed to patients monthly and as needed when specific information was requested. | Yes; calls emphasized self-monitoring and pt education; Printed educational material sent monthly and upon request (in appropriate language). |

| Author, Year | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|-------------------------|---|------------------------------------|---|--|----------------------------|--|--|
| Riegel Carlson, 2002 | Consultation with physicians, other healthcare professionals, and community agencies as needed; facilitated access to medications and patient/physician communication. | Monitored patient for HF symptoms. | Automated reports produced by the CM software updated physicians on patient progress, and physicians were telephoned by the case managers as needed; guidelines for the treatment of systolic HF distributed to physicians. | Decision support software used by CMs to guide and standardize care; automated reports produced by the software updated physicians on patient progress | NR | Care for patients in the usual care group was not standardized, and no formal telephonic case-management program was existed. These patients presumably received some education regarding HF management prior to hospital discharge. | Patient satisfaction at 6 months (Mean \pm SD), intervention vs. control: 22.88 \pm 2.85 vs. 21.66 \pm 3.44; % change=+5.6; P=0.01 (with covariates BB use and chronic lung disease) and P=0.01 without covariates |
| Riegel, 2006 | 4.6 (SD 4.4; median 3; interquartile range 1.5–7) CM contacts involved consultation with other professionals (e.g., physicians, dieticians, social workers) and community agencies. | No; No | Reports mailed to physicians noted when patients were not receiving medications advocated in clinical guidelines. | Decision support software used by CMs to guide and standardize care. | None | Not standardized; involved no formal disease management program; HF management education before hospital discharge (lack of bilingual staff meant much of the discharge instruction was provided in writing). | HRQL and depression, intervention vs. control, mean \pm SD (95% CI): 1) 3 month results: MLHF emotional subscale: 1.5 \pm 2.8 (0.60-2.4) vs. 1.9 \pm 3.8 (0.92-2.9); MLHF physical subscale: 7.5 \pm 6.6 (5.5-9.4) vs. 8.4 \pm 7.4 (6.3-10.4); MLHF total: 12.3 \pm 11.8 (8.7-15.8) vs. 13.9 \pm 13.9 (10.1-17.6); EQ-5D VAS: 70.1 \pm 18.7 (63.8-76.5) vs. 64.0 \pm 27.0 (57.3-70.7); EQ-5D Index: 0.84 \pm 0.14 (0.79-0.89) vs. 2.3 \pm 2.3 (1.6-3.0); Depression by PHQ-9: 1.9 \pm 2.1 (1.3-2.5) vs. 2.3 \pm 2.3 (1.6-3.0) 2) 6 month results: MLHF emotional subscale: 1.4 \pm 3.0 (0.53-2.3) vs. 1.9 \pm 3.3 (1.0-2.8); MLHF physical subscale: 7.5 \pm 7.1 (5.6-9.4) vs. 8.1 \pm 6.7 (6.0-10.1); MLHF total: 12.1 \pm 12.3 (8.9-15.3) vs. 12.9 \pm 10.9 (9.5-16.3); EQ-5D VAS: 73.4 \pm 17.4 (68.6-78.1) vs. 73.7 \pm 17.4 (68.6-78.8); EQ5D Index: 0.82 \pm 0.20 (0.77-0.88) vs. 0.78 \pm 0.20 (0.72-0.84); PHQ-9: 1.5 \pm 2.0 (0.92-2.1) vs. 2.0 \pm 2.1 (1.3-2.6) |

| Author, Year | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|----------------------------|---|-------------------------------------|----------------|---|---|---|-------|
| Riegel Carlson, 2002 | Resource use at 3 and 6 months (Mean \pm SD), CM vs. control; % change; P value with and without covariates of BB use and chronic lung disease: 3 Months: 0HF hospitalization rate: 0.17 ± 0.43 vs. 0.31 ± 0.64 ; -45.7% change; $p=0.03$ w/o covariates, $p=0.03$ w/ covariates; All cause hospitalization rate: 0.45 ± 0.73 vs. 0.61 ± 0.88 ; -25.6% change; $p=0.09$ w/o covariates, $p=0.25$ w/ covariates; HF readmission rate: 14.6 vs. 22.8; -36% change; $p=0.06$ w/o covariates, $p=0.06$ w/ covariates; All-cause readmission rate: 33.8 vs. 41.2; -18% change; $p=0.17$ w/o covariates, $p=0.40$ w/ covariates; HF hospital days: 0.85 ± 2.3 vs. 1.6 ± 3.9 ; -45.9% change; $p=0.054$ w/o covariates, $p=0.56$ w/ covariates; All-cause hospital days: 2.6 ± 4.95 vs. 3.5 ± 7.2 ; -27% change; $p=0.19$ w/o covariates, $p=0.35$ w/ covariates; Inpatient HF costs (\$): 981 ± 3514 vs. 1509 ± 4502 ; -35% change; $p=0.07$ w/o covariates, $p=0.07$ w/ covariates 6 months: Hospitalization rate: 0.21 ± 0.5 vs. 0.41 ± 0.77 ; -47.8% change; $p=0.01$ w/o covariates, $p=0.02$ w/ covariates; All cause hospitalization rate: 0.62 ± 0.88 vs. 0.87 ± 1.1 ; -28.2% change; $p=0.03$ w/o covariates, $p=0.11$ w/ covariates; HF readmission rate: 17.7 vs. 27.6; -35.9% change; $p=0.04$ w/o covariates, $p=0.06$ w/ covariates; All cause readmission rate: 43.1 vs. 50.0; -13.8% change; $p=0.21$ w/o covariates, $p=0.49$ w/ covariates; HF hospital days: 1.1 ± 3.1 vs. 2.1 ± 4.6 ; -46.4% change; $p=0.03$ w/o covariates, $p=0.05$ w/ covariates; All cause hospital days: 3.5 ± 6.6 vs. 4.8 ± 8.3 ; -28% change; $p=0.11$ w/o covariates, $p=0.23$ w/ covariates; Inpatient HF costs (\$): 1192 ± 3674 vs. 2186 ± 6729 ; -45.5% change; $p=0.04$ w/o covariates, $p=0.07$ with covariates | NR | NR | 1145 patients screened/ 573 (50%) met eligibility criteria Of these, 358 (62%) were included in this study (N= 130 intervention group, N= 228 usual care group) | Withdrew during the course of the study (n=28); Lost to FU NR; 100% analyzed; | Withdrew during the course of the study (n=28), 0 withdrew due to adverse outcomes. | NR |
| Riegel, 2006 | HF resource use, CM vs. control, mean \pm SD (95% CI): 1) 3 month: HF results: hospitalization: 0.10 ± 0.35 (0.01-0.19) vs. 0.15 ± 0.40 (0.06-0.25); readmission proportion: 21.7% vs. 26.2%, $p=0.69$; hospital days: 2.19 ± 5.4 (0.8-3.6) vs. 2.40 ± 6.2 (0.98-3.8); inpatient costs (\$): 3045 ± 7784 (302-5788); 4130 ± 14468 (1304-6956) 2) 6 month: HF results: hospitalization: 0.55 ± 1.1 (0.32-0.78) vs. 0.49 ± 0.81 (0.25-0.73); readmission proportion: 31.9% vs. 33.8%; hospital days: 3.65 ± 7.8 (1.9-5.4) vs. 3.40 ± 7.1 (1.6-5.2); inpatient costs (\$): 5567 ± 13137 (2009-9126) vs. 6151 ± 16650 (2485-9818) 3) 3 month all-cause results: hospitalization: 0.48 ± 0.74 (0.27-0.69) vs. 0.65 ± 1.0 (0.43-0.86); readmission proportion: 37.7% vs. 40.0%; hospital days: 3.11 ± 5.7 (1.4-4.8) vs. 4.54 ± 8.1 (2.8-6.3); inpatient costs (\$): 4694 ± 8356 (1342-8045) vs. 8019 ± 18284 (4566-11472) 4) 6 month all-cause results: hospitalization: 1.06 ± 1.3 (0.74-1.4) vs. 1.08 ± 1.4 (0.75-1.4); readmission proportion: 58.0% vs. 56.9%; hospital days: 6.33 ± 9.4 (4.0-8.6) vs. 7.41 ± 9.8 (5.1-9.8); inpatient costs (\$): 10015 ± 16104 (5322-14708) vs. 13967 ± 22923 (9132-18802) | NR | NR | Screened: 425; Eligible: 225 (53%); Enrolled: 135 (60%); Intervention (n=70), Control (n=65); | Lost to follow-up (n=0); Analyzed: intervention (n=69), control (n=65); | Withdrawals: 1; Withdrawal due to adverse events: NR | NR |

| Author, Year | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Crossover); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical comorbidities: 1) List specific comorbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) |
|--------------|--|---|---|--|--|---|---|
| Sisk, 2006 | To compare the effects of a nurse-led intervention focused on specific management problems versus usual care among ethnically diverse patients with systolic dysfunction in ambulatory care practices. <i>A priori hypothesis</i> patients in the focused nurse management program would have fewer hospitalizations and report better functioning than patients in usual care. | Adults 18 years of age or older; EF <0.40 or systolic dysfunction documented on a cardiac test; English-language or Spanish language speakers; community dwelling at enrollment; and current patient in a general medicine, geriatrics, or cardiology clinic at a participating site. | Medical conditions that prevented interaction with the nurse, including blindness, deafness, or cognitive impairment; pregnancy; renal dialysis; terminal illness; or procedures that corrected systolic dysfunction; | RCT; 12 month intervention. | Age: Median and Average NR, Mean (SD) 59 (14); Female: 46%; Ethnicity: Non-Hispanic black 46%, Hispanic 33%, Non-Hispanic white 15%, Other 6%; Spanish-language speaker 23%; High school education 46%; Inadequate health literacy 30%; Insured 96%; Living alone 32%; | Heart failure with systolic dysfunction. 1) Alcoholism 9.4%; Angina 13.1%; Cerebrovascular disease 12.8%; Chronic pulmonary disease 31%; Diabetes 38.2%; Hypertension 70.7%; Ischemic heart disease 44.8%; Moderate or severe renal disease 13.5% 2) Psychiatric disorder 9.9% Depression 14.0% | Multiple comorbidities, ethnic minority population, age. |

| Author, Year | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Did case manager have the ability to adjust medications? (If yes, describe) | Primary Location of Case Manager |
|-------------------------|--|--|---|---|--|--|--|
| Sisk, 2006 | Insurance provider not specified, but overall, 95.6% of patient were insured. | No | Three registered nurses (2 of the nurses were bilingual English/Spanish) | Counseling on diet, medication adherence, and self-management of symptoms; served as a bridge between pt and clinician-coordinated medication changes and exams. | NR | No | One nurse at the 2 municipal hospitals, second nurse at the small community hospital, and second and third nurse delivered intervention at academic center. |

| Author, Year | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self- Management Support (e.g., motivational interviews, coaching setting) |
|-------------------------|--|-----------------|---|--|------------------------------------|---|---|
| Sisk, 2006 | Initial interview face-to-face, follow up by telephone calls, mailed questionnaire at 2, 4, 8, 12, and 24 weeks. | NR | One initial visit. Phone call every 3 months. | One initial face-to-face meeting. | Yes | HF disease and self- management education at initial visit and reinforced with each phone contact; Provided educational booklet in English or Spanish at initial visit. | Self-management education at initial visit and reinforced with each phone contact. |

| Author, Year | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|-------------------------|---|---|---|------------------------------------|---------------------------------------|--|---|
| Sisk, 2006 | At initial appointment, referred as needed to social services, prescription drug or other insurance coverage, home health services, management of depression. | Case managers suggested subsequent examinations indicated by the protocol: 1) ACE inhibitor or ARB: Check creatinine, potassium, and blood pressure levels in 1–2 wk. 2) Beta Blocker: Check blood pressure and heart rate in 1–2 wk. Adjustment: advised provider on medication changes, but CM could not change medications. | Written note sent to patient doctor after each contact with pt, but case managers located at hospitals. | NR | NR | Patients received federal consumer guidelines for managing systolic dysfunction but no other intervention. | Mean change in functioning score, intervention vs. control, difference (95% CI), adjusted difference (95% CI) 12 months: SF-12 physical: 0.5 vs. -2.7, 3.2 (1.0 to 5.3), 3.1 (0.7 to 5.5); MLHF: -1.9 vs. 5.4, -7.3 (-12.1 to -2.6), -7.0 (-12.4 to -1.7) 12 to 18 months: SF-12 physical: -2.1 vs. -0.5, -1.6 (-4.7 to 1.4), -1.7 (-4.2 to 0.9); MLHF: 0.0 vs. -4.6, 4.6 (-1.3 to 10.6), 4.7 (-0.1 to 9.5) |

| Author, Year | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|--------------|--|-------------------------------------|--|---|---|--|-------|
| Sisk, 2006 | <p>All cause hospitalizations (intervention vs. control):</p> <p>1) 12 months: Total hospitalizations, n: 143 vs. 180; hospitalizations/person year: 0.74 vs. 0.93, difference: -0.19 (-0.38 to -0.01), adjusted difference: -0.13 (-0.25 to -0.0001)</p> <p>2) 12 to 18 months: Total hospitalizations, n: 56 vs. 74; hospitalizations/ person year: 0.63 vs. 0.83, difference: -0.20 (-0.46 to 0.05), adjusted difference: -0.10 (-0.19 to -0.02)</p> <p>3) HF outcomes to 12 months: Total hospitalizations, n: 18 vs. 29; hospitalizations/person year: 0.14 vs. 0.28, difference: -0.14 (-0.23 to -0.04), adjusted difference: -0.10 (-0.17 to -0.03)</p> <p>4) ED visits to 12 months, n: 66 vs. 75; ED visits/ person year: 0.76 vs. 0.81, difference: -0.05 (-0.23 to -0.04), adjusted difference: -0.06 (-0.19 to 0.07)</p> | NR | No death or hospitalization was deemed to be caused by the intervention. | Screened 1555, excluded 1149 (228 declined to participate, 36 did not keep intake appointments, 202 deceased, 370 unreachable, 349 ineligible) 406 randomized | <p>All 406 patients included in 18 month analysis.</p> <p><i>CM Group:</i> 86 completed follow-up survey (analyzed), 4 withdrew, 18 died before follow-up, 1 declined survey, 18 could not be reached for 18 month survey</p> <p><i>Usual Care Group:</i> 86 completed follow-up survey (analyzed), 5 withdrew, 20 died before follow-up survey, 4 declined and 12 could not be reached for 18 month survey</p> | No withdrawals due to adverse outcomes reported. 4 withdrawals intervention group and 5 withdrawals in usual care group before final survey. | NR |

Appendix L. Evidence Tables: Case Management for Diabetes Mellitus

| Author, Year (Quality Score) | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) |
|---|---|---|---|---|---|--|--|
| Babmoto et al 2009 (Fair) | To evaluate the relative effectiveness of an intervention delivered by community health workers as compared to NCM or standard provider care on health measures and clinical indicators among Hispanic persons newly diagnosed with DM-II. | (Recruited from 3 inner-city family health centers in LA between 7/02-7/03) 1. Hispanic/Latino by self-report 2. age 18+ 3. Diagnosis of DM-II within 6 mo of enrollment | 1. Previous diagnosis of gestational diabetes 2. Previous diabetes care management | RCT Duration: 12 months of recruitment, ~6 months of followup. | Mean age: CHW 51 +/- 12.5 NCM 50 +/- 12.1 Standard 50 +/- 11 % female: CHW 64; NCM 52; Standard 78 % Parent with DM: CHW 45; NCM 55; Standard 35 | DM-II Only reported co-morbidity was hyperlipidemia: CHW 45% NCM 43% Standard 54% | %Less than 6th grade education: CHW 67; NCM 58; Standard 57 % income less than \$25K/yr: CHW 55; NCM 50; Standard 56 |
| California Medi-Cal Type 2 Diabetes Study Group 2004 (Fair) Pettit 2005: (subset analysis to determine risk of retinopathy in DM-II) | To determine if intensive DM case management using population-directed strategies could improve glycemic control in a Medicaid population of patients with DM-II in which minorities are over-represented. Additionally, to determine if intensive case management could prevent or delay diabetic retinopathy. | 1. Age 18+2. DM-II for at least 1 yr prior to recruitment3. HgA1c >7.5% | NR | RCTDuration: 36 months | Mean age: Intervention 57 +/- 0.9Control 56.9 +/- 11) % Female: Intervention 72.6; Control 70.92) %African American: Intervention 16.1; Control 15.7% Hispanic: Intervention 39.2; Control 38.43) Duration DM: Intervention 10.3 +/- 0.8 yrsControl 12 +/- 0.8 yrs4) HgA1c: Intervention 9.6 +/- 0.1Control 9.7 +/- 0.15) BMI: Intervention 33.1 +/- 0.8Control 31.5 +/- 0.86) SBP: Intervention 136 +/- 2Control 134 +/- 17) LDL: Intervention 129.8 +/- 3.2Control 130.1 +/- 3.6 | DM-IIOther co-morbidities: discuss rates of BMI (obesity) BP (hypertension), and cholesterol (hyperlipidemia). | Patients were recruited from three clinical sites in three counties, all of which served racial/ethnic minorities, and low-income Medicare populations (Medi-Cal) in California.Education level ~40% in each group had an educational level of 8th grade or less. a) % education beyond 12th grade: Intervention 20.8; Control 19.4b) % education 12th grade: Intervention 16.3; Control 23.6b) % education 9-11th grade: Intervention 21.9; Control 17.6d) % education 8th grade or less: Intervention 41; Control 39.4 |

| Author, Year (Quality Score) | Payer/ Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) |
|---|---|--|--|---|---|---|---|
| Babmoto et al 2009 (Fair) | NR | No | The NCM was described as being a registered nurse with "linguistic competence" (presumably in Spanish). No information on education or experience reported. | NCMs interacted with patients in-clinic. NCMs saw patients monthly and prn. They also performed followup calls with patients prn. NCMs followed a "standardized clinic protocol for MD education and monitoring based on ADA clinical recommendations." NCM responsibilities included patient assessment, development of treatment plan incorporating provider treatment, coordination and referral of community resources, and participation in multi-disc conferences to discuss patient status. | CHW received a formal 6-week training program. | Primary care clinic | Primarily in-person appointments (monthly and prn), but also followup calls prn. Frequency of followup calls NR. |
| California Medi-Cal Type 2 Diabetes Study Group 2004 (Fair) Pettit 2005: (subset analysis to determine risk of retinopathy in DM-II) | Medicaid | One of the three recruitment sites was part of a county-wide managed care plan for Medi-Cal recipients. Also, one of the other two sites recruited patients from hospitals and outlying clinic and those patients could be fee for service or part of a managed care plan. | Unclear but seems per the study that case managers can be either registered nurses or registered dietitians. | CMs used evidence-based practice guidelines and algorithms for medication and insulin adjustment collaborating with PCPs. CMs identified patient barriers to care and individualized treatment and education strategies. CMs followed a study protocol with basic guidelines for glucose and medication management for diabetes as well as HTN and dyslipidemia. | NR | Primary care clinic | Unclear. Study reports that "interactions" between patients and CMs occurred in-person at clinic site and via telephone between visits prn. |

| Author, Year (Quality Score) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self- Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) |
|---|--|---|---|--|---|--|---|
| Babmoto et al 2009 (Fair) | 53 patients per NCM **Note, this refers to 53 patients with DM. These same NCMs were also monitoring patients with other diseases, such as asthma.** | Monthly in- person followup and as needed. Telephone calls were as needed. Actual frequency experienced was NR. | Primary care clinic. | Only description provided is that "patient assessment and development of a treatment plan" were part of the NCM's responsibilities. | All patients, regardless of study group, received a packet of diabetes education materials (in Spanish and English and tailored for local Hispanic population) during the initial study visit. | NR | One of the NCM responsibilities is listed as "coordination and referral to community resources" - but no additional information is provided. |
| California Medi-Cal Type 2 Diabetes Study Group 2004 (Fair) Pettit 2005: (subset analysis to determine risk of retinopathy in DM-II) | NR | NR | Primary care clinic | "Study staff" (presumably CMs) met with patients "at study entry and exit to assess overall health status, glycemic control, DM self-care behaviors, and presence of DM- related complications." Presumably, the individualized treatment and education strategies were formed at that time - but that is not explicitly stated. | Education strategies are mentioned as one facet of the CM intervention, but no specifics are provided. More detail on CM interventions in table 2 mentions education specifically with regard to nutrition. | Not specifically reported but patient goals are mentioned in Table 2 with regards to nutrition education. | NR |

| Author, Year (Quality Score) | Medical Monitoring/ Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes |
|---|--|--|-------------------------|---|---|--|
| Babamoto et al 2009 (Fair) | HgA1c and BMI were measured at baseline and 6 months. Adjustment NR | Yes - NCM's saw patients in primary care clinic and participated in multi-disc meetings to discuss patient status. | NR | Two comparators: 1) Standard provider care: standardized clinical care by physicians and NPs. 2) Community health worker (CHW) care: Bilingual CHWs (with high school diploma or GED) and had DM or had experienced it through a family member or friend. Each CHW saw between 1-35 patients and conducted individual educational sessions based on ADA standards (with participants and their families), made "routine" followup calls to monitor progress and assisted in problem solving and barrier identification. CHWs utilized program education materials based on a standardized curriculum. | 1. Self-reported quality of health: NSD within group for change in self-reported health for NCMs or standard care, but was significantly improved in CHW group ($p<0.05$). 2. 2+ servings fruit a day: within group improvement for fruit and vegetable intake for the CHW and NCM groups but not for standard care ($p<0.05$). Significant difference between groups ($p<0.05$). 3. 2+ servings vegetables a day: Improvement in exercise in CHW and standard care but not NCM ($p<0.05$). Significant difference between groups ($p<0.05$). 4. Exercise 3+ times/week: All groups had significant improvement in HgA1c ($p<0.05$). Between group differences NR. 5. Mean HgA1c 6. Mean BMI: there was NSD in BMI within or between groups. | 1. ER admission in previous 6 months (study period): there was NSD in ER visits among CHW and NCMs, but ER utilization increased significantly in the standard care group ($p<0.05$). The difference between groups was also significant ($p<0.05$). |
| California Medi-Cal Type 2 Diabetes Study Group 2004 (Fair) Pettit 2005: (subset analysis to determine risk of retinopathy in DM-II) | In the intervention group, HgA1c was measured quarterly. In the usual care group, the HgA1c was measured every 6 months. Adjustment: NR (suspect "no" as the CMs worked in conjunction with primary care providers). | Yes (see previous cell) | NR | Usual care: HgA1c q6 mo and presumably usual MD appointments (although not specifically reported) | 1) Primary outcome: changes in glycemic control (measured by change in HgA1c)a) Both usual care and intervention groups experienced declines in HgA1c during the study period, the reduction in the intervention group was greater at each time point ($p<0.01$). b) Patients in the intervention group achieved their target HgA1c more often than those in usual care, regardless of HgA1c target ($P<0.01$).2) Secondary outcomes: NSD between groups for weight, BMI, SBP, DBP and lipids3) Risk of development of retinopathy in control vs. intervention groups: OR 5.35 [95% CI 1.14 –2.12], $p=0.034$ | NR |

| Author, Year (Quality Score) | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to followup/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals/ withdrawals due to adverse events | Notes |
|--|---|--|---|--|---|----------------------------|
| Babmoto et al 2009 (Fair) | 1. Never forgetting to take medications: significant within-group improvement the percent of patients who never forgot to take medications among NCM and standard care groups ($p<0.05$), but not for CHWs. Significant difference between groups ($p<0.05$). | NR | 1,352 screened/ 354 eligible/ 318 randomized | They report patients who "did not complete the program" as a lump number of 129 or 41%. This number included patients who moved out of the area, withdrew, or were lost to followup. | NR | No sample size calculation |
| California Medi-Cal Type 2 Diabetes Study Group 2004 (Fair) Pettit 2005: (subset analysis to determine risk of retinopathy in DM-II) | NR | The incidence of severe hypoglycemia was greater in the intervention group compared to usual care, but this difference was not statistically significant ($p=0.28$). | Screened: 1,597/ Eligible: 362/ Randomized: 362 | Withdrawn: NR / Lost to f/u: 41 total (15 in intervention and 26 in usual care)/ Analyzed: 317 (171 intervention, 146 usual care) | NR | |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) |
|--|--|---|---|---|---|---|--|
| Gary et al 2003 (Fair) | To determine whether multi-faceted, culturally sensitive primary care-based behavioral interventions could improve measures of DM control. | 1. Age 35-75 2. African-American ancestry 3. DM-II 4. Live in East Baltimore (by zip code) 5. Received primary care in the year prior at either Johns Hopkins Outpatient Center or the East Baltimore Center for primary care. | 1. Have a co-morbid illness which was felt to likely limit lifespan to <4 years (ex: cancer, AIDS) 2. Have end-stage diabetes complications (dialysis, renal transplant, blindness, or LE amputation) | RCT Enrollment between 4/95-2/97 with 2 years of followup | Mean age: Usual 57+/- 8; NCM 59+/-11 CHW 59+/-9; NCM/CHW 60+/-7 1) % Female: Usual 74; NCM 76; CHW 78; NCM/CHW 78 2) Duration DM (yrs): Usual 9+/- 8; NCM 8+/-8; CHW 8+/-8; NCM/CHW 12+/-8 3) Uses BP meds (%): Usual 62; NCM 84; CHW 68; NCM/CHW 78 4) Uses cholesterol meds (%): Usual 18; NCM 18; CHW 22; NCM/CHW 25 5) Mean BMI: Usual 34+/- 8; NCM 33+/-8; CHW 33+/-5; NCM/CHW 33+/-7 Mean HgA1c: Usual 8.5+/- 2; NCM 8.8+/-2.2; CHW 8.4+/-2; NCM/CHW 8.6+/-1.9 | DM-II Comorbidities: NR; we assumed a reasonably high rate of hypertension given BP med use, and a relatively low rate of hyperlipidemia given cholesterol medication use. Assumed a high percentage of the overall population has obesity, based on the mean BMI. | Included only African-Americans in East Baltimore. 1) Mean: years of education: Usual 10+/-3; NCM 10+/-2; CHW 9+/-3; NCM/CHW 10+/-3 2) % yearly income ≤\$7500: Usual 44; NCM 42; CHW 61; NCM/CHW 43 3) %receiving medical assistance: Usual 50; NCM 34; CHW 46; NCM/CHW 36 |
| Gary et al 2004 Gary et al 2005 Gary et al 2009 (Fair) | To determine the effectiveness and cost-effectiveness of primary care and community-oriented interventions in managing HgbA1c, BP, lipids, and reducing ER and hospitalization visits over 2 years | Patients: age ≥ 25 years; DM-II; African-American, living in inner-city Baltimore; receiving care at one of 6 included clinic sites; member of managed care organization or included fee-for-service plans; able to provide contact info for 2 family members not living in the home. | Comorbid condition(s) likely to lead to death within 3-5 yrs (ex: cancer, AIDS, ESRD, active TB, Alzheimer's, CHF - all by ICD-9); unable or unwilling to give informed consent; unable to complete baseline assessment; likely to move from Baltimore City in the next 24 mo; have severe psychiatric condition that would limit participation in the intervention | RCT Enrolled between Oct 2000-June 2002 and followed-up for 30 mo. | Minimal vs. Intensive Intervention Mean age: 56.3+/-10.8 vs. 58.8+/-11.3 %Female: MI: 74 vs. 72.1 Current tobacco: 27.1% vs. 32% BMI: 34.9+/-8.6 vs. 34+/-8.2 Mean HgA1c: 8+/-2.2 vs. 7.9+/-2.2 Mean SBP: 137+/-20 vs. 137+/-21 Mean DBP: 80+/-11 vs. 80+/-11 Mean HDL: 51.3+/-15 vs. 51.1+/-14.9 | DM-II Comorbidities: NR but can assume amount of comorbid obesity given mean BMI.; Gary et al 2005 reports 69% categorized as obese (BMI ≥30) | Urban, African-American Minimal vs. Intensive Intervention Annual income <\$7500: 35.5% vs. 33.5% Education (years): 11.5 +/-2.8 vs. 11.5+/-2.5 Unemployed: 4.4% vs. 4.8% Gary 2005 reported poor glycemic control and poor BP control were present in 43% and 72% "respectively" (groups unclear). |

| Author, Year (Quality Score) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) |
|---|--|---|---|---|--|---|--|
| Gary et al 2003 (Fair) | NR | NR | Registered nurse with bachelors in training to be a certified diabetes educator. Years of experience NR. | The NCM coordinated patient care using ADA practice guidelines. NCM provided patient care, management, education, counseling, f/u, referrals, and physician feedback. Regimen changes were implemented under physician's orders. | NR | Clinic | 3, 45-minute face-to-face contacts a year or telephone contacts. |
| Gary et al 2004 Gary et al 2005 Gary et al 2009 (Fair) | Either managed care or fee-for-service | Yes (some) | RN with bachelor's degree and "relevant case management experience." | The intensive intervention arm included NCM and community health worker (CHW) collaborative involvement. The NCM trained and supervised CHWs, oversaw baseline assessment and plan informed physicians about sub-optimal care patterns and involved in insulin titration. High school educated CHWs are African-American women familiar with the setting and without prior healthcare training; had a high-school education CHWs participated in the intake assessment and plan formation, identify non-medical barriers (ex: illiteracy) and work to find solutions to those barriers. Some visits in project office or by phone, some in patient's home, and some in community. | 6 weeks training process. Gary et al 2009 described 6 weeks of training as having 6 phases including guidelines, practical info, patient self-management education, home-based assessment and education, field experience, skill reinforcement, and maintenance and quality control. | Primary care clinic | Unclear, seems primary NCM contact with patient is at clinic visit. |

| Author, Year (Quality Score) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) |
|---|--|--|--|---|---|---|--|
| Gary et al 2003 (Fair) | NR | Phone followup prn. | In-person contact occurred in clinic. (Note: 25% in the NCM-alone group received at least 3 visits. 50% received at least one telephone intervention). | NCM determined needs of patients through baseline assessment. Patients were asked to prioritize three domains related to their DM care for initial attention. | Education is listed as part of NCM's interventions, but no additional information is provided. | NR | Summaries of intervention visits were provided to PCPs. |
| Gary et al 2004 Gary et al 2005 Gary et al 2009 (Fair) | 1:269; N = 269 in the intensive intervention arm. Per Gary et al 2005, there was one NCM. | NCM conducts (minimum) 1 face-to-face clinic visit with each patient each year. CHW has at least 3 contacts with each patient annually. | NCM: face-to-face time occurs in clinic. CHW: Some visits in project office or by phone, some in patient's home, and some in community. | Plan is formed by NCM with input from CHW at initial baseline assessment. | Patients in the intensive intervention group received DM-specific education (pamphlets, newsletters) via the mail. Gary 2009 specified that both NCMs and CHWs utilized clinical algorithms and interactive action plans to direct education and followup with patients. | NR | Written summary is sent to each patient's PCP after assessment. |

| Author, Year (Quality Score) | Medical Monitoring/ Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes |
|---|---|--|-------------------------|--|--|---|
| Gary et al 2003 (Fair) | HgA1c, lipids, and BP were monitored as part of the baseline assessment and the 2-yr f/u assessment. | Yes. NCMs provided intervention summaries to PCPs. | NR | <p>Usual care: continued ongoing care from their own health care providers. They also received a quarterly newsletter on DM-related health topics.</p> <p>Community health worker (CHW): CHWs were high school graduates attending college part time. No formal health care training prior to the study. Provided ~3, 45-60 minute in-home meetings per year or telephone contacts prn. CHWs monitored patient and family behavior, reinforced adherence to therapy, mobilized social support, and provided feedback to physicians.</p> <p>NCM and CHW combined: (See above); goal for each NCM and CHW to have approximately 3 visits per year with patients and prn.</p> | <p>1) HgA1c: Reported decline NCM group compared to control, no p value provided. p values was <0.05 for NCM+CHW compared to control for decrease in HgA1c.</p> <p>2) DBP: Improvement (p<0.05) for NCM+CHW, but NSD for NCM intervention alone.</p> <p>3) SBP: Worsening of SBP in the NCM group vs usual care (no p value given).</p> <p>4) Cholesterol: LDL worsened in all intervention groups because LDL improved in usual care. HDL improved in NCM+CHW but not in NCM alone; no p values provided.</p> <p>5) Triglycerides: significant improvement for NCM+CHW (p<0.05) but not for NCM alone.</p> <p>6) Significant within group differences (p<0.05):</p> <p>a) HgA1c decreased significantly in the NCM+CHW group.</p> <p>b) LDL increased in all groups (significantly in NCM and NCM+CHW) compared to usual care..</p> <p>c) SBP increased significantly in the NCM group.</p> <p>7) NSD between groups for dietary scores, physical activity index, or BMI.</p> | NR |
| <p>Gary et al 2004</p> <p>Gary et al 2005</p> <p>Gary et al 2009 (Fair)</p> | <p>At baseline and at 24 months, HgA1c, HDL, creatinine, and urine albumin are measured. Vitals (including BP) are also measured during this time. A questionnaire is also administered.</p> <p>Adjustment: Unclear</p> | Yes - patient care summaries are sent to PCPs. Also, NCMs coordinated between patient and PCP (ex: prompting physician to suboptimal care patterns). | NR | <p>Comparator: "minimal intervention" group. Involved q6-12 mo phone calls by a lay health educator (LHE); in phone calls LHE reminded patients of preventive diabetes-related healthcare activities; provided summary of patient health-care utilization and general recommendations (based on ADA guidelines) to the patient's PCP.</p> | <p>HgA1c: NSD within group or between group differences.</p> <p>NSD between group differences for blood pressure, BMI, HDL, or total cholesterol.</p> <p>HDL cholesterol: significant within-group increase in HDL in favor of the intensive group (p<0.05)</p> <p>Significant within-group decline in DBP for intensive intervention group (p<0.05)</p> <p>When intensity of meetings with CHW/NCM was considered, those patients who had more visits with a CHW/NCM had a statistically significant decline in HgbA1c compared to the minimal intervention group (p=0.03).</p> | <p>At 24 mo, the intensive intervention group had fewer hospitalizations compared to the minimal care group (RR0.77, 95%CI 0.59;1.0) but this was not statistically significant.</p> <p>Those individuals with more NCM/CHW visits had significantly fewer ER visits (p<0.05, RR 0.66, 95%CI 0.43; 1.0).</p> <p>Although a similar trend was seen for frequency of hospitalizations, the 95%CI crossed 1 (RR0.91, 95% CI 0.64; 1.19).</p> <p>At 36 mo, those who had higher frequency of CHW had significantly fewer ER visits or hospitalizations compared to minimal intervention but not depended on NCM intervention frequency (p<0.05, RR 0.53, 95%CI 0.36; 0.80 and 0.44, 95%CI 0.27; 0.73 respectively).</p> |

| Author, Year (Quality Score) | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to followup/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals/ withdrawals due to adverse events | Notes |
|--|--|-----------------------|---|---|---|--------------|
| Gary et al 2003 (Fair) | NR | NR | Screened: 3,800/Eligible: 666/ Randomized: 186 | ~16% loss to followup | NR | |
| Gary et al 2004 Gary et al 2005 Gary et al 2009 (Fair) | NR | NR | Screened: 120,000/ Eligible: 2,064/ Enrolled: 542 | Unclear: 18 deaths, and 36 "lost" but no further detail provided. | NR | |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) |
|---|--|---|--|---|--|---|--|
| Krein 2004 (Fair) | To evaluate the effects of a collaborative CM intervention for patients with poorly controlled T2 diabetes on glycemic control, intermediate cardiovascular outcomes, satisfaction with care, and resource utilization. Hypothesized that case managers would facilitate more timely and appropriate changes in medication treatment, prompt detection of potential problems, and better patient self management. | Identified potential study subjects had at least one prescription for an oral hypoglycemic agent, insulin, or blood glucose monitoring supplies filled in the previous 12 months. Most recent HbA1C level was 8.5% (within the last year) and had a general medicine clinic visit scheduled between May 1999 and January 2000. During screening visit, patients were eligible if HbA1C $\geq 7.5\%$. | Persons <18 years, never diagnosed with diabetes or before the age of 30 years; no telephone; did not speak English; were not competent for interview; reported primary source of diabetes care outside the VA; current treatment for cancer (other than nonmelanoma skin cancer); had kidney failure, symptomatic heart failure, liver disease, or blindness; spent winter at another residence or planned to move. | RCT Duration: 18 months | Age: 61 years of age 97% Men 51% White | DM 1) Average of 4 co-morbidities (based on the sum of 11 disease categories identified by outpatient diagnoses data: neoplasm, endocrine and metabolic diseases (excluding diabetes), mental disorders, disease of the blood, nervous system, circulatory system, respiratory system, digestive system, the genitourinary system, skin, and musculoskeletal system. 2) Mental: see above | Average length of diabetes onset= 11 years; 45% if participants rated health as poor or fair (see previous cell, average number of co-morbidities= 4 |
| Shea et al, 2002 Shea et al, 2006 Trief et al, 2006 Trief et al, 2007 Shea et al, 2007 Shea et al, 2009 (Fair) | A telemedicine intervention will improve outcomes among Diabetics in medically underserved areas via 1) more rapid behavior changes, 2) changes in treatment regimen, and 3) more rapid achievement of glucose and BP control. | Ages 55+; current Medicare beneficiary; have DM; live in a federally designated medically underserved area (MUA) or health professional shortage area (HPSA) | Moderate or severe cognitive impairment; severe impairments in areas that would preclude ability to utilize telemed intervention including: vision, mobility, fine motor coordination, hearing; severe comorbid conditions likely to result in death or disability during study; no free electrical outlet; spends more than 3 months at location other than home. | RCT (randomized within clusters defined by PCP panels) Duration: 2 years | Mean age: 71 years in both groups Male: 36.5% CM vs. 37.9% usual care Black: 15.3% CM vs. 14.5% usual care Hispanic: 35.8% CM vs. 34.6% usual care ≥ 13 yrs education in 16.1% CM vs. 17.5% usual care Annual household income of <\$10,000: 50.8% CM vs. 47.8% usual care | Diabetes Comorbidities (CM vs. usual care): 1) DM duration ≥ 15 yrs 30.8% vs. 32.2% 2) DM management with insulin alone 14.5% vs. 14.4% 3) Mean HgbA1c of 7.36 vs. 7.40 Coexisting mental illness: NR | Older (age 55+); Annual household income <\$10,000 (50.8% CM and 47.8% usual care) |

| Author, Year (Quality Score) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) |
|---|--|---|---|--|--|--|--|
| Krein 2004 (Fair) | 100% VA; 60% had other insurance besides VA | Yes, VA | NP, case manager | Case managers scheduled followups according to individual patient needs (e.g., someone newly started on a medication; encouraged patient self-management (e.g., diet and exercise); provided reminders for recommended screenings/tests; helped with appointment scheduling; monitor home glucose and blood pressure levels; identified and initiate medication and dose changes as needed. To facilitate treatment changes, medication treatment algorithms were used, modified to correspond with the National VA Diabetes Guidelines. Providers were notified by internal e-mail if a medication change was recommended | 2-day training for case managers included instruction on collaborative goal setting, with case examples and role-playing used to familiarize them with the treatment algorithms. | VA Clinic | Face to face visits, and followup phone calls |
| Shea et al, 2002 Shea et al, 2006 Trief et al, 2006 Trief et al, 2007 Shea et al, 2007 Shea et al, 2009 (Fair) | Medicare | No | Described only as "nurse care manager." | Video-conference between patient and NCM every 2 weeks and prn to: followup CBGs and BPs remotely via tele-health system; monitor endocrinology if medication adjustment felt needed (after which recommendation made to PCP); served as resource referral for individualized patient needs. | Nurse care manager trained in diabetes management, trained in use of computer-based case management tools | 2 locations (to accommodate urban and rural population components); Berrie Diabetes Center at Columbia University, Joslin Diabetes Center at SUNY Upstate Medical University, Syracuse | Telemedicine videoconference |

| Author, Year (Quality Score) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) |
|---|--|---|---|--|--|---|---|
| Krein 2004 (Fair) | 120/case manager (60 patients per 20 hour week case manager) | 3 visits per year, followup calls as needed | Unclear | Yes | On-going | Yes | Yes, with primary care via summary statements and direct discussions. |
| Shea et al, 2002 Shea et al, 2006 Trief et al, 2006 Trief et al, 2007 Shea et al, 2007 Shea et al, 2009 (Fair) | 1 NCM: 200 subjects | Unclear: Shea et al, 2002 implied NCM contact with patient every 2 weeks and prn (pg 52) Trief et al, 2007 reported that videoconference occurred every 4-6 weeks routinely, and every 2 weeks for "significant need." Trief et al 2006 reported that, over the first year, mean home televisits was 28.3 +/- 15.2 (median 28) In addition, a physical exam and in-person survey was completed at baseline and at 1 year but not by NCMs and were blinded to patient's study group. | Not clearly stated, but I believe zero. Two exams were performed (baseline and 1 year), but these exams were NOT performed by NCMs. | Unclear Trief et al, 20007 noted that role of NCMs via videoconference was to educate patients, facilitate goal-setting/self-management, and discuss concerns. Shea et al, 2009 reported that the goal for NCM interventions were based on clinical practice guidelines. | Shea et al, 2002 stated that education and information are available in "small pieces" via the project Web site. "NCMs actively invite and coach patients to use these information resources." | NR | NCMs assess patients via telemed. If intervention or changes are felt to be needed, NCMs may d/w endocrinologist and make recommendations to PCP. |

| Author, Year (Quality Score) | Medical Monitoring/ Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes |
|---|---|---|--|--|---|---|
| Krein 2004 (Fair) | Yes & NP could adjust with permission of physician. | Yes, sent summary statements and consulted about medication adjustments (also gave PCP the choice to defer to the NP case manage). | No, not part of intervention. | Usual care: all participants were given an A&D Medical semiautomatic blood pressure monitor, home blood pressure monitoring guidelines, a lay version of the VA Diabetes Clinical Guidelines, and a periodic study newsletter. Patients in control group received usual care from their PCP. | Absolute difference of CM-control (95% CI) with p values: 1) A1C: 0.13 (0.40 to 0.68), p=0.13 2) Change in SBP: 2 (4 to 8), p=0.53 3) Change in DBP 0.85 (2 to 4), p=0.61 4) Change in LDL: 5 (17 to 6), p=0.37 5) General satisfaction: 0.47 (0.2 to 1), p=0.04 | Intervention vs. Control 1) VA Hospitalizations: 21 (19%) vs. 25 (24%) p=0.42 2) VA PCP visits: 6 (4%) 6 (4%) p= 0.39 3) Received care outside VA: 24 (22%) 41 (39%) p=0.007 |
| Shea et al, 2002 Shea et al, 2006 Trief et al, 2006 Trief et al, 2007 Shea et al, 2007 Shea et al, 2009 (Fair) | Home telemonitoring system had ability to upload and store blood pressures and blood glucose values. Per Trief et al, 2006, mean number of blood glucose uploads in 1st year was 560.2, and blood pressure uploads was 184.6 NCM communicated with PCP for any suggested medication adjustment. | Yes. Patients are recruited from primary care clinics. PCPs retain autonomy in decision making for their patients; NCMs only make suggestions based on their telemedicine patient interactions. | The home telemonitoring unit provided each patient access to their own clinical data as well as access to an educational web page for this project (created by ADA). Patients were able to upload blood glucose and blood pressure values via their home telemonitoring unit. This information was then available to patients and NCMs. | Usual care: patients in the usual care group were cared for by their PCPs. PCPs received a mailing with current guidelines for patients with DM. No other guidance from study personnel was provided to PCPs for usual care group. | <u>Shea et al, 2006 (@1 year)</u> 1) HgbA1c: 0.18% lower in CM vs. usual care group (p = 0.006); 0.32% greater in CM vs usual care (p = 0.002) 2) BP: Reductions for SBP and DBP lower in the CM group (p = 0.001 for SBP and p <0.001 for DBP); BP changes in the usual care group are reported as "small." No intergroup comparisons noted. 3) LDL cholesterol: Differences in LDL were significant in groups (p<0.001); no intergroup comparisons noted. <u>Trief et al, 2006</u> 1) Baseline depressive symptoms did not predict change in HgA1c (estimate = 0.016, p>0.35) in either groups. <u>Trief et al, 2007</u> 1) NSD between groups for change in depression (p = 0.30) or "diabetes distress" (p = 0.77, p = 0.98). <u>Shea et al, 2009 @ 5 years</u> 1) HgbA1c: CM group improvement relative to usual care (p = 0.001), 0.29 (95% CI 0.12; 0.46). 2) LDL cholesterol improvement compared with usual care (p < 0.001). 3) CM group achieved greater reductions in SBP and DBP compared to usual care (p = 0.024 and p < 0.001 respectively) Mortality: HR 1.01, 95% CI 0.82; 1.24 | Total cost: telemedicine unit was \$3,425 (\$3000 for patient station, \$225 for BP cuff, \$75 for cables, \$125 for cart, and \$110 for Glucometer). |

| Author, Year (Quality Score) | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to followup/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals/ withdrawals due to adverse events | Notes |
|---|---|---|---|--|--|---|
| Krein 2004 (Fair) | Dilated eye exam <12 months: 96 (87%) 84 (79%) p=0.11 NSD in aspirin use (p=0.15) NSD in statin use (p=0.20) | NR | 691 screened/NR/ 246 randomized | Lost to followup: 11/ Withdrawals: NR/ Analyzed: 209 | NR | Collected qualitative data via semistructured telephone interviews with 40 intervention patients; 20 from each site. |
| Shea et al, 2002 Shea et al, 2006 Trief et al, 2006 Trief et al, 2007 Shea et al, 2007 Shea et al, 2009 (Fair) | NR | NR Shea et al 2009 did mention that "no serious adverse events" were experienced related to the intervention. | Screened: 9,597/ Eligible: 1,927/ Randomized: 1,665 | Withdrawn/lost: 248 (144 intervention, 104 usual care) | Total withdrawals: *Withdrawals vs lost not entirely clear - these numbers extrapolated from Figure 2 of Shea, 2006.* Usual care withdrawals: 31 (15 due to death) Intervention withdrawals: 160 (18 due to death) Total withdrawals: 191 | |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) |
|--|--|---|---|---|--|--|--|
| Wolf 2004 (ICAN) Wolf 2007 (Good) | To compare the efficacy of lifestyle case management to usual care given in the primary care setting measured by clinical, health-related quality of life (HRQOL), and economic outcomes. Hypothesized that a modestly priced, registered dietitian (RD)-led case management approach to lifestyle change would be more effective than usual medical care for patients with obesity and T2 diabetes. | > 20 years of age, DM-II confirmed by a physician, diabetes medication use, BMI \geq 27, ability to comprehend English, and primary health insurance is Southern Health Services health plan. | Pregnancy, cognitive limitations, or other medical reasons preventing diet or exercise modifications. | RCT 12 months | Age: Mean=53 years 60% Female 80% White SES: NR | Obese, DM-II Comorbidities: NR Coexisting mental illness | 1) Average of 7 years with diagnosis of diabetes 2) Average body mass index=37.5 3) Average waist circumference=117 cm 4) Average of 2.6 other conditions besides diabetes 5) Average of 6 medications per day |

| Author, Year (Quality Score) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) |
|--|--|---|---|---|---|---|--|
| Wolf 2004 (ICAN) Wolf 2007 (Good) | Southern Health Services medical plan | Yes, Southern Health Services | RD | Overall: One RD CM met with participants individually, in groups, and by phone for assessment, goal setting, education, and referrals to community resources. Clinical care: RD CM reviewed lab results and discussed patient-care issues with physicians when appropriate. Individual sessions: occurred 6 times throughout the year (total= 4 hrs). Followup visits reassessed if goals met and if not, discussed ways to overcome barriers; goals were reset. Monthly calls: provide support. Participants were given the LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) manual. | NR | Clinic | Sessions with RD and monthly telephone calls. |

| Author, Year (Quality Score) | Caseload | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self- Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) |
|--|--|--|---|------------------------------------|---|--|--|
| Wolf 2004 (ICAN) Wolf 2007 (Good) | All participants in intervention group (n=72). | Unclear about study visits; monthly followup calls. | 6 times per year, a total of four hours. | Yes, via phone | Participants attended six, 1- hour small group (10 or more people per group) sessions designed to educate subjects about diet and physical activity to improve glucose control and weight loss. | NR | Yes |

| Author, Year (Quality Score) | Medical Monitoring/ Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes |
|--|--------------------------------|--------------------------------|-------------------------------|---|---|---|
| Wolf 2004 (ICAN) Wolf 2007 (Good) | No/No | Unclear | No, not part of intervention. | Usual care group received written educational material including the LEARN manual. Patients seen by research associate every 3 months for weight measurements and to complete questionnaires. The RA answered questions but did not assess, set goals, or have an ongoing dialogue about a participant's diet or physical activity level. | Intervention vs. Control (@ 12 months, 95% CI) Primary outcomes: 1) Weight: - 4.0 kg (-5.6 to -2.5) @ 12 mo p<0.001 for between group comparison of weight loss in favor of intervention group 2) Waist: 5.5 cm (7.4 to 3.6) vs. 1.4 cm (3.1 to -0.4) p<0.001 for between group comparison of decrease in waist circumference, favors CM group Secondary outcomes: 1) A1C values: a) 4 mo: 0.57%, 1.0 to 0.2; p =0.008 b) 8 mo: 0.35%, 0.8 to 0.1; p=0.10 c) 12 mo: 0.20%, 0.7 to 0.3; p=0.45 2) Total cholesterol: -8.6 mg/dl (22.6 to 5.5); p=0.23 3) LDL cholesterol: - 0.07 mg/dl (9.4 to 9.3); p=0.99 4) HDL cholesterol: 0.40 mg/dl (1.9 to 2.7); p=0.73 5) Triglycerides: 36.0 mg/dl (-106 to 34); p=0.31 6) Quality of Life: a) Emotional 15.1 (3.4-26.8) b) Physical 10 (1.2-24.7) | Prescription meds: 0.8 (0.05-1.1) fewer total medications per day vs. usual care group (p=0.03). 95% CI and p-value for absolute cost difference of intervention vs. control: 1) Mean health care cost: -8,374 to -353 (p<0.05) 2) Mean pharmaceutical cost: -70 to \$280 (NS) 3) Cost of ER visits: 862±1,488 vs. 849 ± 662 (p=0.97, NS) |

| Author, Year (Quality Score) | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to followup/ analyzed (Overall) List by specific outcomes (list of differential lost to followup) | Total withdrawals/ withdrawals due to adverse events | Notes |
|---|--|-----------------------|---|---|---|--------------|
| Wolf 2004 (ICAN) Wolf 2007 (Good) | NR | None reported | NR/NR/147 | 29/0/147 | 29/NR | |

Appendix M. Evidence Tables: Case Management for Cancer

| Author, Year | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/ Type (e.g., RCT); Duration | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Co-existing mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) | Payer/ Insurance Carrier (e.g., Medicare, Medicaid, private) |
|------------------|---|---|--|--|--|---|--|--|
| Engelhardt, 2006 | To evaluate coordinated care program for patients with advance illnesses & its impact on patient satisfaction with health care & provider communication, advance directive (=AD) wishes & health care costs | VAMC patients with cancer (e.g., esophagus, trachea, colon, liver, Hodgkin's disease, or multiple myeloma) and COPD or CHF patients who had 1 more admissions ICU 2 or more acute-care admissions within 6 months | NR | Clinical Trial, 6 months | Mean Age: Intervention: 70.3; Usual care: 70.8 Gender (% Female) Intervention: 18.8% Usual care: 23.9% Race and/or ethnicity Intervention: 88% White, Usual care: 85% White SES Intervention: 37.8% lower middle Usual care: lower middle 38.4% | Patients with advanced cancer & patients with COPD & CHF 1) Population had cancer with COPD and CHF 2) NR | Poor (27% low middle income) Elderly > 65yr (46% & 53%) | Medicare: 60%, 62%; Medicaid: 5.8%, 3.5% |
| Goodwin, 2003 | To evaluate the effect of nurse case management (NCM) on the treatment of older women with breast cancer | Women aged 65 and older, newly diagnosed with breast cancer | Patients identified more than 2 months after diagnosis | Randomized prospective trial, 12 months | 1) Control: Age, mean: 72.9 ± 7.4, Mean education years, Mean:10; currently married, 35.1% Income <\$15,000/year,56.5 % Supplemental insurance,60.2 % Medicaid,11.1 % Ethnicity, % Non-Hispanic white, 68.1 ; Black, 22.3 ; Hispanic, 7.2 , Other, 2.4 , Lives alone, 33.3%; MMSE score, mean: 27.2 ± 3.1; Local or regional stage, 93.9% ; Seeing male surgeon, 75.9% ; Seeing board certified surgeon, 97.1% ; Seeing low-volume surgeon, 32.1% 2) Intervention: Age, mean: 71.8 ± 6.6; Mean education, years: 11 ; Currently married,42.5 %; Income <\$15,000/year, 49.6%; supplemental insurance, 58.9% Medicaid, 10.6% ; Ethnicity, Non-Hispanic white 72.6%; Black 19.6; Hispanic 6.0 Other 1.8; Lives alone, 36.7%; MMSE mean: 27.3 ± 3.2; Local or regional stage, 93.3% ; Seeing male surgeon, 81.4% ; Seeing board certified surgeon, 96.2% ; Seeing low-volume surgeon, 36.5% | Breast Cancer NR | NR | Medicaid, controls: 11.1 %; intervention group: 10.6% |

| Author, Year | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (e.g. clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face to Face Time Location of face to face time (e.g., in clinic, home) |
|---------------------|---|--|--|---|---|---|---|---|---|
| Engelhardt, 2006 | Yes, VA | Nurses, NPs, or social workers familiar with institutional policies & who had ongoing relationships with providers | "Advanced Illness Coordinated Care Program" (AICCP) program in which a care coordinator provided assistance with provider communication, care coordination & support; clarified patient preferences for care using worksheets; provided emotional & social support. | Reviewed assigned readings; AICCP training manual & training courses | Unclear; likely VA clinic | In-person | NR | 6-sessions | During AICCP program sessions |
| Goodwin, 2003 | "Supplemental insurance", unnamed. | BS degree registered nurses with previous experience with CM in other settings | NCM interacted with client via home visits, telephone appointments, visited client if hospitalized, & at other community locations. Nurse roles: educator, counselor, advocate, & coordinator of care; services provided for 12 months; also employed standard assessment instruments: activity of daily living scale, instrumental activity of daily living scale, MMSE, Geriatric Depression Scale | 40 hrs of training from advance practice nurses in oncology & geriatrics on treatment & complications of breast cancer, availability of community resources, assessment of older patients, & methods of communicating with treating physicians; educated in the evaluation & treatment guidelines (NCI) & given patient-education brochures produced by the American Cancer Society & the NCI | Hospital | Telephone, in person visit | Three nurses, 169 patients; 56-57 subjects per CM | Patient need determined frequency of contact--minimum contact during intervention period included at least one in-person assessment and monthly telephone calls | At least one in-person assessment, duration NR |

| Author, Year | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support (e.g., motivational interviews, coaching, patient goal setting) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others | Describe comparator (e.g., usual care) |
|---------------------|---|--|--|--|--|--|--------------------------------|---------------|--|
| Engelhardt, 2006 | Provided help with AD planning, coping with loss of ability; addressing family conflict & EOL decisions; promoted advance planning. | NR, part o the six sessions presumably | Provided information to guide patients through the medical information available & treatments; enhancing self-management skills. | Yes | NR; NR (unlikely) | NR | VA medical centers records | NR | NR |
| Goodwin, 2003 | Assessment activities: assessed understanding of & adherence to medications, assessed social support, assessed emotional & cognitive status, monitored surgical wound healing; Planning: goal setting, decision-making, & planning with healthcare professionals. | NR | Checklist outlining steps in the case management & the specific activities (available to patient by request) | Planning with healthcare professionals | Monitored surgical wound healing; assessed understanding of & adherence to medications; No | Yes; planning with healthcare professionals; attended medical appointments with patient. | NR | NR | NR, only described as controls not receiving intervention. |

| Author, Year | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/ enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|------------------|--|--|-------------------------------------|---|--|---|--|--|
| Engelhardt, 2006 | AD: mean # ADs per patient for intervention significantly higher (mean = 1.2, SD = 1.0) than usual care (mean = 0.8, SD = 1.1 at 3 months (p = .01) ; more intervention patients completed AD (69.4% vs 48.4%; p = .006); Intervention group had increased patient satisfaction with care, communication (p = .03) & fewer reported problems with provider support (p = 0.03). | Healthcare Costs of Patient Participants by Treatment Group & Time T1: 6 months pre baseline, usual care & intervention P < 0.01 T2: 3 months pre baseline, usual care P = .3650 ; intervention P = .9727 | NA | NR, did report that the intervention helped avoid adverse events. | Number screened: NR eligible: NR , enrolled: 275 (intervention: 133 usual care: 142) | (AICCP = 86, UC = 100) completed study | NR | |
| Goodwin, 2003 | In women undergoing breast-conserving surgery, more in the NCM group received adjuvant radiation (78.3% vs. 44.8%; P = .001) & auxiliary dissection (71.4% vs. 44.8%; P = .057). Women in the NCM group with advanced cancer more likely to receive chemotherapy (72.7% vs 30.0%, P = .057). Two months after surgery, more in the NCM group had normal arm function (93% vs. 84%; P = .037) & were more likely to state "that they had a real choice in their treatment" (82.2% vs. 69.9%, P = .020). | More women in the NCM group received breast-conserving surgery (28.6% vs. 18.7%; p = .031) & radiation therapy (36.0% vs. 19.0%; P = .003). NCM group also received more breast reconstruction surgery (9.3% vs. 2.6%, P = .054) | NR | NR | Number screened: NR eligible/enrolled: 335; 169 to intervention group, 166 to control group | Number withdrawn: Lost to fu: Analyzed (Overall): 335 | Total withdrawals: 14 | Only 155 from intervention group analyzed. |

| Author, Year | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/ Type (e.g., RCT); Duration | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Co-existing mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) |
|---|--|--|--|---|---|---|---|--|
| Jennings-Sanders, 2005 (Oncology Nursing) | To describe how nurse case managers care for older women with breast cancer. | Women aged 65 - 89, newly diagnosed with breast cancer | Same as Goodwin 2003. | A randomized prospective trial, 12 months | NR, but presumably same as Goodwin 2003. | Breast Cancer1) NR2) Assessed for the presence of "depressive symptoms" using the self-reported CES-D scale | Income < 15,000 per year; needs assistance with activities of daily living | NR |
| McCorkle, 1989 | To compare the effect of two different home care treatment regimens to usual care on the psychosocial well-being of patients with lung cancer. | Lung cancer patients with Stage I lung cancer or higher; lived in King County, WA, & met Medicare criteria for being homebound, capable of cooperating with study requirements & completed informed consent. | Patients receiving home nursing care within 6 months of study and/or enrolled in home health agency. | RCT, 6 months | 1) Sample: (n=166) Age (No., %) 60-69: 71, 43% Gender (% Female) 31% Race and/or ethnicity :white 89% SES income <15,000 yr: 14% 2) Subsample: (n=78) Age (No., %) 60-69: 35, 45% Gender (% Female) :47% Race and/or ethnicity: White 72% SES income <15,000 yr: 12% | Lung cancer NR | Low SES, social dependency | Eligibility criteria included meeting Medicare criterion so possibly, yes. |
| McCorkle, 2000 | To determine if follow-up by an advanced practice nurse improves survival compared to patients in an ambulatory setting | 60 years or >, newly diagnosed & operated on for solid tumor with an anticipated survival of 6 months or more (primary surgical removal of cancer only) | NR | RCT, 4 weeks | Intervention: Female 48.4 % ; white 71.1% ; Aged 60-64 years 36.8 % Control: Female 55.7%, white 77.3%; Aged 60-64 years 31.9% | Cancer, solid tumor (multiple types, e.g., breast, colorectal, prostate) 1) Mean number of comorbidities (SD) Intervention: 2.4 (1.3) Control: 2.3 (1.4) p=.280 (specific NR) 2) Depressive symptoms | 2 or > co-morbidities | NR |

| Author, Year | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (e.g. clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face to Face Time Location of face to face time (e.g., in clinic, home) |
|---|--|---|---|---|--|--|---|--|---|
| Jennings-Sanders, 2005 (Oncology Nursing) | NR | RNs with specialized training in nurse case management | Multiple nursing interventions--included in each phase of the Model: assessment, planning, implementation, & evaluation over a period of 12 months | NR | Hospital | Telephone, in person visit | Three nurses, 159 patients; 53 subjects per cm (Note: this differs from Goodwin 2003, since this study reports 10 subject did not receive CM) | Mean # of contacts: 24.57; (assessment =18.46, planning = 7.75, implementation = 17.55, and evaluation =12.57) -for most contacts, the NCM case manager performed more than one intervention | Nurse contact with participants was made by phone or in person. Location & Duration: NR |
| McCorkle, 1989 | NR | Nurses with master's degrees, training in providing personalized care to advanced cancer patients & families. | Two intervention groups: oncology home care nurses (OHC), or a regular home care group (SHC) consisting of a team of: team consisted of registered nurses, physical therapists, home health aides, medical social work, occupational therapist, & speech pathologist (both compared to no home care). | OHC nurses: specialized training in: symptom management, cancer treatments, pain management, physical and psychosocial assessment, grief & mourning theory, communications systems, community resources & agencies, systems analysis, self-support, professional role development, pathophysiology of death, & research theory & methodology. | Unclear, "19 hospitals and one radiation outpatient clinic used for recruitment", probably hospital based staff. | Interviews | NR | Interviews, 1 per month | 5 interviews in 6-month; depending on intervention group either in home or in office/clinic |
| McCorkle, 2000 | NR | Advanced practice nurses with masters specialized in oncology | 4 week intervention consisting of home visits & multiple telephone calls post surgery & hospitalization; provided direct care, psychological support and functioned as a liaison for other services; available 24 hrs by pager | NR | Unclear | Home visits & telephone | NR | Pre-determined home visits (three) & telephone calls (five) + according to patients' needs; APNs available 24-hours | Three home visits, patient home |

| Author, Year | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support (e.g., motivational interviews, coaching, patient goal setting) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others | Describe comparator (e.g., usual care) |
|---|--|--|--|--|--|--|---|---------------|---|
| Jennings-Sanders, 2005 (Oncology Nursing) | Planning: decided treatments, decreased fragmentation of healthcare, identified problems & complications & facilitated appropriate treatments. Decreased intensity or frequency of NCM contact over time Assessment: personal characteristics, diagnosis, health status, functional status, educational needs, resources, & personal preferences for optimal health status. | NR | Goal setting; increased competency for self-care & appropriate utilization of resources | NCM offered emotional support, teaching, enlisted social support, coordinating care, providing referrals, & accompanying patients to physician visits; "Advocacy, Coordination, Referral, Interaction" | Managing symptoms; No | Yes, coordination, referral, accompanying patients to physician visits | NR | NR | NR |
| McCorkle, 1989 | Patient needs assessed during home visit interviews. | NR | NR | Yes, specialized services by other disciplines coordinated as needed | Yes; NR but for physicians in office group, yes | Unclear | A MR Review Instrument used to collect utilization information & health stats | NR | The office care group (OC) received usual care from their physician but no home care. |
| McCorkle, 2000 | Followed specific guidelines to assess patient needs | Patients & caregivers received skills training | Teaching & counseling | Assisted with obtaining services & other community resources | Monitored physical, emotional, & functional status; NR | Yes, when complication occurred, physicians contacted | NR | NR | Rec'd standard post-operative care in hospital & routine follow-up in outpatient clinics upon discharge |

| Author, Year | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/ enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|---|---|---|--|----------------|--|--|--|---|
| Jennings-Sanders, 2005 (Oncology Nursing) | NR | Assessment phase: assessing the functional status (mean= 14.73) & emotional status (mean= 16.46) of patients required the highest number of NCM contacts. Planning care with the patient required (mean= 3.63) NCM contacts. Implementation phase, teaching patients (mean= 10.91 NCM contacts) Evaluation phase, monitoring the progress of patients required (mean= 12.20 NCM contacts) | NR | NR | Number screened: NReligible/enrolled: 335; 169 to intervention group, 166 to control | Withdrawn: 10 from intervention group | Withdrawn: 10 from intervention group | Same population studied by Goodwin et al 2003. |
| McCorkle, 1989 | Symptom Distress scores: significant difference between time profiles HC nursing groups & OC. (p= 0.03); Enforced Social Dependency: HC groups independent longer than CP (p=0.02) | Hospitalizations: 194 hospitalizations total OHC mean no. = 2.1 hospitalizations, SHC= 2.8, OC = 2.6; Length of hospitalization: OHC = 258 day SHC = 3 17 days OC group OC = 272 days (reported not significant but p-value NR) | OC group reported better health perceptions over time compared to HC groups (p<.005) | NR | 900 eligible, 166 enrolled | 66% (n = 111) died; relocated (n = 3); unknown (n = 2) | 11 patients too sick for interviews | Tables only report no. & % or means (see footnotes for p-values). |
| McCorkle, 2000 | Quality of Life Outcomes, Length of survival: 2-yr survival rate= 66.7% in intervention group vs. 39.6% control group (P < .05) Risk of death: usual care patients (adjusted hazard ratio 2.04; CI, 1.33-3.12; p= .001) compared intervention group (Note: Post-hoc analyses) | NR | NR | NR | 401 enrolled, 375 at baseline; randomized, CM: 190; usual care:185 | 93 (25%) patients died; 41 (22%) CM, 52 (28%) controls | NR | |

| Author, Year | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (e.g., RCT); Duration | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES | Primary disease of population Other medical co-morbidities: 1) List specific co-morbidities 2) Co-existing mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) | Payer/ Insurance Carrier (e.g., Medicare, Medicaid, private) |
|--------------|--|---|--|---|---|---|--|--|
| Moore, 2002 | The aim of this study was to assess the effectiveness of a nurse-led follow up in the management of patients with lung cancer | Patients with lung cancer expected to live at least 3 months. | Patients receiving cancer treatment, close medical supervision, or had a poor prognosis or performance status. | RCT, 12 months | Age mean (SD): 67 years 8.8, (range 45-89) Female: 25% | Lung cancer 1) COPD (8%), cardiac disease (29%), pleural effusion (2%), hypertension (18%), arthritis (22%), GI disease (28%) 2) Emotional, cognitive functioning | See previous cell | NA (UK) |
| Mor, 1995 | To assess a short term, educationally oriented approach tested in a RCT of cancer patients undergoing outpatient chemotherapy. | RI residents; at least 21 yrs of age; initiating a new course of chemotherapy at one of two hospital based clinics or 8 private oncology practices. | Patients receiving only hormonal therapy | Randomized trial, 6 mos. | Controls: Age (%) 21-54: 43.8; 55-74: 50.8; 75+:5.5l Gender (% Female) 64.1 White: 95.3% Case managed: Age (%) 21 54-65.4; 55-74: 39.4; 75+:11.0 Gender (% Female) 65.4 White: 96.0% | Cancer (Breast, lung, colorectal, lymphoma & other) NR | High unmet need status:" transportation, housekeeping, forms, financial, any activity" | NR |
| Ritz, 2000 | To evaluate the quality of life & cost outcomes of CM on women with newly diagnosed breast cancer. Hospital-to-community "standard medical care" | Women, 21 years or >, newly diagnosed with breast cancer. | NR | RCT, 2 years | Intervention: Range (35-85 yrs) Age (Mean) 55.7 Gender (% Female) 100 Race and/or ethnicity -White 97% SES Income under 31,000 23% Control: Range (35-85 yrs) Age (Mean) 55.3 Gender (% Female) 100 Race and/or ethnicity -White 97% SES income under 31,000 25% | Breast Cancer 1) NR 2) Mental illness NR but mood/wellbeing assessed | NR | NR |

| Author, Year | Managed Care (Yes/No); if yes, name organization or describe | Characteristics of the case manager: discipline, lay worker, peer educator, degree, years of experience | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (e.g. clinic visit, telephone) | Caseload | Frequency of visits and phone calls | Face to Face Time Location of face to face time (e.g., in clinic, home) |
|---------------------|---|---|---|--|--|---|--|--|---|
| Moore, 2002 | NA | Clinical nurse specialists | Provided information, support & coordination with agencies or other services; telephone assessment or clinic appointment 2 weeks after enrollment; follow-up clinic assessment every 4 weeks or telephone assessment; provided weekly, open access nursing clinics & same day appointments. | Observing outpatient lung cancer clinics & shadowed medical consultants; nurse academics provided regular clinical supervision sessions. | Specialist cancer hospital & three local cancer units. | Clinic, monthly calls & weekly open access clinic | NR | Monthly, mean = 3 calls per month; length of contact =23 minutes (range 2120) | Clinic |
| Mor, 1995 | NR | Phone interview conducted by "trained research reviewer" | Short-term case management intervention including: 1) initial home visit, 2) initial needs assessment, 3) development of an intervention plan 4) follow-up phase, 5) termination visit; patients received 2 visits & intervening phone calls with individualized information services | NR | NR | Initial home visit, telephone calls and termination home visit | Unclear, from the context it seems there was only 1 CM for 127-128 patients. | One initial visit, one termination visit; phone calls at two-week intervals. Average number of phone calls: 5.2, average duration: 34 mins | Initial home visit: average 80 mins; |
| Ritz, 2000 | NR | Two advanced practice nurses registered nurses with master's degree in nursing & in-depth patient knowledge & skill in the care of the patient population | Patients received "advanced practice" nurse interventions based on Brooten's cost quality model and Oncology nursing model and follow care with an APN. | NR | Hospital | Clinic visits, hospital, telephone, & home visits | 2 APN : 106 patients | Patient, family and CM need-determined. CM on-call all days during the daytime, mean time per patient over study period: 1,377 mins. | In person during assessments & therapy, duration NR |

| Author, Year | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support (e.g., motivational interviews, coaching, patient goal setting) | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment | Integrated within primary care | Health IT (include EMR) | Others | Describe comparator (e.g., usual care) |
|---------------------|--|--|--|---|--|--|--------------------------------|---------------|--|
| Moore, 2002 | Notes from nurse led clinic sent to general practitioner, home care team or hospice. | NR | NR | Yes, made referral to medical team if new patient symptoms or rapid worsening of condition reported, & to social services | Yes, monitored patient. symptoms & condition; NR | Yes, "rapid & comprehensive communication" with general practitioner & primary healthcare team by telephone, fax, or letter; (documentation sent to patient caregiver & PCP) | NR | NR | "Conventional medical follow-up" (with MD), details NR |
| Mor, 1995 | CM telephoned patients at two week intervals to assess new unmet needs requiring intervention. | Per protocol CM to function as a "patient educator," provided disease, treatment & nutritional information as part of the intervention plan. | NR | Provided information on the service resources needed by the patient that were located near the patient's home. | Patients' ratings for severity of symptoms (e.g., pain, nausea, dry mouth, appetite) at 3 and 6 months; NR | NR | NR | NR | Control Group, details NR |
| Ritz, 2000 | Pre and post operative assessment; & during therapy | NR | Therapy included motivational interviews for patient well being and coaching; health promotion | Coordination of social services, financial services, community support groups, etc. | Wound care, labs; NR | Yes | NR | NR | "standard medical care" |

| Author, Year | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/ enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|--------------|---|--|--|----------------|---|---|--|-------|
| Moore, 2002 | Quality of life: less severe dyspnea 3 mo.(P=0.03) ; better emotional functioning (P=0.03) less peripheral neuropathy(P=0.05) at 12 months patients overall satisfaction at 3, 6 & 12 months: no difference between groups (P=.08) | CM at 3 mos) : Fewer medical consultations with a MD at (P=0.04); fewer radio graphs taken (P=0.04); more likely to have radiotherapy treatment (P=0.01) ; no sig. difference in cost of care (P=0.66) | Among 144 (73%) of the 197 general practitioner surveyed, NSD in satisfaction were reported between the patient groups. | NR | 203 of 271 of eligible patients enrolled; nurse led follow up (n=100); conventional follow up (n=103) | 68 (25%) declined to participate 43 (16%) eligible patients preferred a MD; died intervention (n=20) ; controls (n=17) | "unwell" (n=30) in each group | |
| Mor, 1995 | Controls: (Mean, SD) 1) 3 month: QOL 7.2, SD 2.2; treatment disruption: 5.4, SD 4.6; mental health index 71.68 SD 16.80; Symptom control outcomes: pain (none 55.1, mild: 15 , moderate: 17 severe: 13), nausea (none 58, mild: 18, moderate:12 severe: 12), dry mouth (none 66 , mild: 20, moderate: 8.3 severe: 5.6), constipation (none79.6 , mild: 11.1 , moderate:6.5 severe: 2.8), poor appetite (none 62.0 , mild:8.3, moderate:16.7 severe:13.0); 2) 6 month: Mean QOL7.2, SD 2.4 treatment disruption 4.2 SD 4.4; mental health index 75.5, SD 13.2; Intervention (Mean, SD): 3 month: QOL 7.0 SD 2.0; treatment disruption 5.1 SD 4.1; mental health index 74.7, SD 13.2; 6 month: Mean QOL, 7.1, SD 2.3, treatment disruption 3.4, SD 4.2; mental health index 74.4, SD 15.0; Symptom control outcomes: pain (none 46.2,mild: 17.6, moderate: 24.2 severe: 12.1), nausea (none78.0,mild: 15.4, moderate:3.3 severe: 3.3), dry mouth (none 71.4 , mild: 17.6 moderate: 7.7 severe: 3.3), constipation (none 85.7 , mild 7.7, moderate: 4.4 severe: 2.2), poor appetite (none 72.5 , mild:9.9 , moderate: 7.7 severe: 9.9) | Patterns of health, social and transportation use(avg): 3 months (control vs. CM) physician visits 9.6; hospital days10.0; home care services: agency hours 2.8; nurse hours NR; transportation services agency hours:1.3 vs. CM group: physician visits9.6; hospital days14.6; home care services: agency hours 6.0; nurse hours 3.0; transportation services agency hours:2 6 months (controls vs. CM): physician visits 7.7; hospital days7.8; home care services: agency hours0; nurse hours 3; transportation services agency hours:4.5 vs. CM group: physician visits 8.6; hospital days 10.7; home care services: agency hours NR; nurse hours 3.6; transportation services agency hours: 1.5 | Treatment disruption: Mean, (SD) 3 months- Controls: 7.23 (2.16) Experimental group: 6.96 (2.01) 6 months- Controls: 7.18 (2.42) Experimental group: 7.12 (2.27) | NR | 414 eligible; 11 not contacted (at physicians discretion) | Abstract reports 257 patients participated; Attrition: 40 lost at 3 months (217 participated); 32 additional lost at 6 months (185) | NR | |
| Ritz, 2000 | No difference in POMS scores,(p= 0.93); mood disturbance decreased in unmarried women (P=.011), decreased mood disturbance in women with no history of BC (P=.004 at six months); well being at 1 month better in intervention group (P=0.036) | Cost data: no sig. difference in distribution of charges (P >.05 for all); no sig. difference in cost measures (P >.05 for all) | NR | NR | 588 screened, 210 enrolled | analyzed for cost data: 141 | NR | |

Appendix N. Evidence Tables: Case Management for Serious Chronic Infections

| Author, Year (Quality Score) | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES |
|------------------------------|---|--|--|--|---|
| Husbands, 2007 (Poor) | Among people living with HIV/AIDS (PLHAs), who and with what characteristics and circumstances, benefit most from case management vs. self-directed access to support services? Also what are the comparative costs to society? | HIV+, ≥ 16 years of age, new or current user of support services at the AIDS Committee of Toronto in Canada, able to understand spoken English themselves or with an interpreter, in touch with reality. | NR | Singled-blind RCT Duration 6 months | Age Mean 42.27 +/- 8.92 13% female; 1% transgender 70% Caucasian/white 84% spoke English 89% \geq high school education |
| McCoy, 1992 (poor) | Is case management superior to one-time referrals to services on demand as needed by HIV-positive IDUs? Will the case-managed group receive higher numbers of services than the control group? | HIV-seropositive IDUs who were involved in other studies at UM-CDRC (University of Miami Comprehensive Drug Research Center). | NR | RCT (Demonstration project) Duration: 1-year | Age range: <25 (9%); 26-30 (22%), 31-35 (27%); 36-40 (29%), 41 (13%); 36% Female 86% Black 76% without regular employment |
| Nickel, 1996 (Poor) | To assess whether nurse case management, as compared to usual care, affects the QOL of AIDS pts on home care. | AIDS diagnosis; referred for home care to one of the seven participating agencies. | < 21 years; those determined to be near death at the time of the CM first visit; refused home care. | RCTDuration: 2.5 years (Jan 1990-June 1992) Note: Subjects followed throughout the course of home care or until project closure in August1992. | Age ranges: 20-29 (23%); 30-39 (53%); 40+ (24%)93% male79% white 63% were participating in Medicaid |
| Sorenson, 2003(Fair) | To address the question of the utility of CM in a population of substance abusers with HIV/AIDs. | Adults who met DSM-IV criteria for substance dependence, hadHIV infection as verified by their medical charts with CD4 ≥ 50 in the last 6months, willing to provide informed consent and urine specimens. | Currently enrolledin substance abuse treatment or case management, diagnosed with medical conditions indicating they would likely be deceased within 6 months, nonresidentsof San Francisco, or in police custody. | RCTDuration: 1 year | Age: NR73% menRace: 43% African American, 7% Hispanic, 8% other/mixed ethnicity, 42% Caucasian7% employed |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Cross-over); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES |
|----------------------------------|---|---|--|--|---|
| Wohl, 2006; Sansom, 2008; (fair) | To evaluate the impact of a directly administered antiretroviral therapy program (DAART) and intensive adherence case management (IACM) intervention on virologic and immunologic response to highly active antiretroviral therapy (HAART) among patients at 3 public HIV clinics in Los Angeles County, California. | Treatment-naïve and treatment-experienced persons for whom no more than 1 prior Cregimen had failed; MMSE score=23, live or work within the DAART workers' catchment areas. | Those with advanced liver or kidney disease, were receiving directly observed therapy for TB, or were participating in clinical trial that prohibited participation in an adherence-support program. | RCT Duration: 6 months | 82% >30 years 75% Men 64% Latino; 24% were African American) 56% self-identified as heterosexual 73% Unemployed; 64% reported annual incomes of <\$10,000 |
| Nyamathi, 2006 (fair) | 1) To compare the effects of an intervention program (conceptually based on Comprehensive Health Seeking and Coping Paradigm; Nyamathi, 1989), employing nurse case management against a control program with standard care on LTBI treatment completion in a homeless population, and 2) To compare the effectiveness of the two programs in improving TB knowledge over a 6-month treatment period. | Spent the previous night in one of the study's homeless shelters; no self-reported history of completing TB prevention therapy; between the ages of 18 and 55, or >55 years of age, reported risk activation factors for active TB (diagnosis of immune compromising diseases or taking immunosuppressant medications), and willing to undergo further diagnostic testing at the John Wesley Community Health Medical Clinic at the Weingart Center LA. | Cognitive impairment (e.g., active hallucinations or stupor, refused chest x-ray, missed physical exam, excluded by PCP, refused DOT | RCT (conducted from 1998-2003) Duration= 6 months | Age means(SD): 41.5 (8.5) 80% male Race/ethnicity: Black (81%), Hispanic (9 %), White (7%); |
| Hsieh, 2007 (fair) | To explore the efficacy of hospital-to-community level case management with DOTS to monitor the adherence of patients with pulmonary TB in Taiwan. Hypothesis: adherence, rate of completion, treatment success, sputum conversion, and chest X-ray improvement in experimental Group 1 who received CM with DOTS would be significantly improved compared with experimental Group 2 and Control group. | 18 years of age or older, no cognitive impairment, spoke Mandarin or Taiwanese, did not have atypical or extrapulmonary TB, chronic hepatic or renal disease, and were willing to participate in the study for the entire 6 months. | Not specified | quasi-experimental design, using age and gender as matching factors, subjects were randomly assigned to one of three groups; May 2002 to July 2003 | Mean age 68 years, 81% male, .80% lived with family or friends SES: NR (85% unemployed/retired) |

| Author, Year (Quality Score) | Primary disease of population 1) List specific co-morbidities 2) Co-existing mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of co-morbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); |
|-------------------------------------|---|---|--|---|
| Husbands, 2007 (Poor) | HIV/AIDS Co-morbidities: 1) 73% depressed at baseline, mean CESD score of 28.4 (\pm 13.1). 2) Means years since HIV/AIDS diagnosis 8.72 (\pm 13.1) | 80% with annual income < \$20K; 72% on disability 10% worked full or part time 51% lived alone | National Health Care Insurance (Canadian) | Yes, National Health Care Insurance (Canadian) |
| McCoy, 1992 (poor) | HIV+ Co-morbidities: NR | Low income IVDUs | South Florida AIDS Network (a program within the Public Health Trust of Dade County) | No |
| Nickel, 1996 (Poor) | AIDS Co-morbidities: NR | NR | NR (63% were participating in Medicaid either at study entry or during FU) | No |
| Sorenson, 2003(Fair) | HIV+Co-morbidities: NR Co-existing mental illness: NR | Most with unstable living situations (e.g., homeless, living with friend/relative, halfway house, hotel/motel); substance abuse. | NR | No |
| Wohl, 2006; Sansom, 2008; (fair) | HIV+Co-morbidities: NR | Challenges to HAART adherence (authors note that adherence barriers were not assessed before randomization) | LA County public-health HIV clinics | No |
| Nyamathi, 2006 (fair) | Latent tuberculosis infection (LTBI)1) Co-morbidities: NR | Homeless; 75% without health insurance | 10% Medicare | No |
| Hsieh, 2007 (fair) | TB | unclear (rate of TB med completion with DOT in Taiwan in 2001 was 74% according to authors) | NR | NR |

| Author, Year (Quality Score) | Characteristics of the case manager | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload |
|------------------------------|--|--|---|--|---|----------------------------|
| Husbands, 2007 (Poor) | NR | Strengths-based model of CM where case manager works with the client to assess and prioritize the range and mix of their challenges and strengths in the areas of daily living, housing, finances, social supports, vocation, health, leisure or meaningful activity); The CM attempts to actively link the PLHAs with a range of services as needed. | Manual used to train CM in of the strength-based model of case management. | AIDS service organization | NR | NR |
| McCoy, 1992 (poor) | Bachelor-level health educators with no social work training | 3 CMs with specific assigned caseload; CM model: needs identification through screening; regular, ongoing HIV prevention education; need for health and mental health care, social and economic services, and addiction treatment services; CM program used regular and frequent (every 2 weeks) monitoring of patients' use of the above-identified services to determine access, compliance with treatment, and the reassessment of any needs or problems for treatment or intervention. | In-service training programs were held with CMs to familiarize them with the relationship between drug addiction and HIV transmission and to demonstrate risk-reduction counseling and behavioral skills, such as needle cleaning, for this population. | South Florida AIDS Network (a program within the Public Health Trust of Dade County) | Unclear | 1:30 to 1:35 (CM: clients) |
| Nickel, 1996 (Poor) | Nurses specialized in HIV care | Direct services by the NCM and consultation to the agency nurse assigned to the patient; intervention protocol included: patient assessment, careplanning with monthly care review by an interdisciplinary team consisting of the NCMs, agency home care nurse and other specialists (e.g., infections disease, public health, social worker, clergy member); twice monthly review of subject needs by CM team and directed patient to community network for and authorization of services; ongoing case manager observation and monitoring of subject reports of service quality. | Training of the case manager <i>in study protocols</i> was conducted by the study investigators. | NR | Weekly phone calls, monthly visits. | 1:12 or less |

| Author, Year (Quality Score) | Characteristics of the case manager | Describe case management intervention | Describe pre-intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload |
|----------------------------------|--|--|--|---|---|----------|
| Sorenson, 2003(Fair) | Paraprofessionals who were former consumers of HIV or substance abuse treatment services with a high school equivalency degree, certified chemical dependency counselors with a successful work history in treatment programs. | CM program was in place when the study began and included: service brokerage (advocating for client entry to programs) and counseling (continuing contact with patients through a 1-year period); focused on linking patients with services; made appointments for evaluation and follow-up care and accompanied patients to appointments. | 1-week orientation to policies and procedures upon joining the CM program. Supervised by a licensed clinical social worker through direct observation, daily supervisory meetings, and weekly case presentations that were observed by the clinical social worker and a consulting psychiatrist. | CM program based out of a public teaching hospital. | Mode of overall contact: 57% calls; 43% visits | 1 per 20 |
| Wohl, 2006; Sansom, 2008; (fair) | Described as "trained case manager" | IACM patients self administered their HAART and met weekly for 6 months with a trained case manager to overcome barriers to HAART adherence while also engaging in traditional case-management activities including: referrals for health care payment issues, housing support, drug abuse treatment, legal services, and nutritional support. | NR | HIV clinic where participant received care | In-person clinic visits | NR |
| Nyamathi, 2006 (fair) | CM included a research nurse (community-based nurse trained in the care of homeless patients) and a trained outreach worker. | 8, 1-hour TB education sessions, by their nurse and outreach worker over the 24 weeks of treatment; provided with community resources; escorted to their medical and social service appointments; tracked by the outreach worker when they missed a DOT dose. Note: identical LTBI medical treatment, medical monitoring and incentives as the control group | The research nurses and outreach workers received special training as extended care providers to ensure optimal skills in providing the intervention. | Unclear likely at the Weingart Center) | 8, 1-hour TB education sessions by their nurse and outreach worker over the 24 weeks of treatment; outreach worker tracked patients when they missed a DOT dose; escorted to their medical and social service appointments. | NR |

| Author, Year (Quality Score) | Characteristics of the case manager | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload |
|---|--|--|--|---|--|-----------------|
| Hsieh, 2007 (fair) | NR | Group 1: DOT under direct supervision of the case manager 7 days/wk for 2 mo, self-administration after the second month with one unscheduled home visit per week by a casemanager; Group 2: self administered medicine with a monthly unscheduled home visit by a casemanager. Both groups were offered clinical medical care and nursing instructions according to the clinical pathway for TB during hospitalization. | NR | unclear | in person | NR |

| Author, Year (Quality Score) | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews] | Coordination of Services (e.g., medical, social services, financial services) |
|------------------------------|--|---|--|---|---|--|
| Husbands, 2007 (Poor) | NR | NR | Case management records were developed for each client and served as evidence that strengths-based case management for each domain of life was indeed provided. Records included notes on intake, assessment and reassessment, service planning, coordination and referral, monitoring and follow-up and discharge and transition planning." | NR | NR | (See Planning and Assessment) |
| McCoy, 1992 (poor) | NR | NR | Occurred during intake (details not specified) | Educated patients about risk reduction strategies (average= 30 minutes) | NR | NR |
| Nickel, 1996 (Poor) | Weekly phone | Monthly in-person visits | Yes | NR | NR | Yes |
| Sorenson, 2003(Fair) | Phone calls and visits for the year of treatment: 43.8 (SD = 50.3); median=30. Seven participants had 100 or more activities. CMs provided 12 or fewer activities to about a fourth of the participants. Total: 49% of activities (phone calls and visits) occurred in months 1–3, and 72% of activities occurred in months 1–6. | Community (64%), hospital (16%), office (20%). | NR | Description of CM activities included risk reduction education | NR | 73% of programs contacted/ referrals made were defined as non-drug, 27% defined as drug. CMs focused on linking patients with services that included medical care, psychiatric treatment, legal assistance, and social service entitlements such as low-income housing and Supplemental Security Income (SSI). |

| Author, Year (Quality Score) | Frequency of visits and phone calls | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews] | Coordination of Services (e.g., medical, social services, financial services) |
|-------------------------------------|---|---|--|--|---|--|
| Wohl, 2006; Sansom, 2008; (fair) | Scheduled to meet weekly for 6 months; <i>Average number of meetings with CM = 14</i> | In person during clinic visit; <i>Average meeting duration = 30 minutes; Total time spent with CM = 7 hrs.</i> | Yes (met weekly with CM to discuss) | Yes, regarding adherence to HAART | Yes, support to adhere to HAART | Referrals for health care payment issues, housing support, drug abuse treatment, legal services, and nutritional support. |
| Nyamathi, 2006 (fair) | 8, 1-hour TB education sessions by their nurse and outreach worker over the 24 weeks of treatment (otherwise #, length, and location of contacts not specified) | See previous cell | Unclear | 8, 1-hour TB education sessions by their nurse and outreach worker over the 24 weeks of treatment. | Included 1) self esteem and attitudinal readiness for change; 2) TB and HIV risk reduction education; 3) coping, self management, and communication skills; 4) cognitive problem solving to implement behavior change; and 5) positive relationships and social networks to maintain behavior change. | Provided with community resources and escorted medical and social service appointments. |
| Hsieh, 2007 (fair) | Group 1: DOT daily times 2 months; weekly home visit times 6 months; Group 2: monthly home visit times 6 months | Group 1: DOT daily times 2 months; weekly home visit times 6 months; Group 2: monthly home visit times 6 months | CMs responsible for offering counseling, DOT, following up on the patient's treatment status, and corresponding and communicating with public health nurses. | Hospital clinic staff were responsible for providing health education information to subjects in Group 1 and 2 | "CMs responsible for offering counseling" | CMs responsible for offering counseling, DOT, following up on the patient's treatment status, and corresponding and communicating with public health nurses. |

| Author, Year (Quality Score) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|------------------------------|---------------------------------|---|-------------------------|--|---|
| Husbands, 2007 (Poor) | Both NR | No | NR | Usual care: Self-directed Use of Support Services Program which included psychosocial counseling, employment counseling, social support and support groups with or without practical assistance as needed (e.g. meals, furniture, good food box, buddies, drives to medical appointments, congregate dining, referrals to other agencies). These services are provided if a PLHA asks; that is, services are provided on demand or at the request of the PLHA. | 1) Depression: (CES-D scale scores divided into very depressed (VD) and less depressed LD) a) Mental Health Function Index Scores for VD (CM vs. usual care): 31% improvement vs. 1% deterioration (p = .015) b) Social Function Index Scores for VD (CM vs. usual care): 45% improvement vs. 27% deterioration (p = .001) c) Physical Health Summary Score (CM vs. usual care): 16% improvement vs. 7% deterioration (p = .009) d) Mental Health Summary Score (CM vs. usual care): 30% improvement vs. usual care = 4% deterioration (p = <.0001) |
| McCoy, 1992 (poor) | NR; Adjustment No | No | NR | The control group utilized the services of a bachelor-level, experienced social worker on staff at CDRC who, on request and without a formalized needs assessment, during a brief intervention session, referred study participants to health and social services. | NR |
| Nickel, 1996 (Poor) | Yes, monitoring; no adjustment | Communication with PCP at least monthly | NR | Usual care was provided by agency home care nurses who provided care to AIDS patients through procedures comparable to those for patients with other diagnoses (e.g., needs assessment, care planning and revision, and delivery of care as needed). Included 24-hour on-call services. | NSD in QOL or Quality of Well-Being between groups at 3 and 6 months |

| Author, Year (Quality Score) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|----------------------------------|--|--------------------------------|-------------------------|--|--|
| Sorenson, 2003(Fair) | No; No | No | NR | Brief contact with the department of psychiatry at SFGH provided brief contact and referral through its AIDS and Substance Abuse Program (ASAP).When ASAP workers (included both professionally trained individuals (e.g., social workers) and paraprofessionals (former consumers of substance abuse or HIV services)) received a referral from the research project, they met with the patient at the hospital program. They provided education about reducing the risk of HIV transmission, information about HIV services, and referrals to substance abuse treatment, social services, and HIV services in the community. | The sex risk index was greater (i.e., more risk) for the brief contact group. NSD in substance use, HIV risk behaviors, physical and psychological status, quality of living situation. |
| Wohl, 2006; Sansom, 2008; (fair) | No; decisions were made by the medical staff in the clinics. | Yes | NR | Self-administered their HAART and continued to receive the services that were available to all clinicpatients, including quarterly contact with a case manager. DAART: received daily delivery of HAART, specially-trained, bilingual community worker observed the participant take 1 daily HAART dose. Community workers delivered evening, weekend, and holiday doses for self administration. At the next meeting, patients were queried about the self-administered doses, and empty packages were collected. Adherence problems were addressed by the community worker when possible, and participants were referred to the clinic staff when necessary. | 6 months: <400 copies/mL (NSD)1) DAART group, 54%2) IACM group, 60%3) Usual care group, 54% @ 6 months: Co-treatment analyses (NSD) of undetectable viral loads:1) 71% of the DAART patients2) 80% of the IACM patients3) 74% of the usual care undetectable viral loads at 6 months (P > .05). Note: NSD in viral load reduction, median CD4+ cell count, change in CD4+ cell count from baseline, or percentage of patients with a CD4+ cell counts <200 cells/mm3 or patients with new or recurrent opportunistic infections. |

| Author, Year (Quality Score) | Medical Monitoring & Adjustment | Integrated within primary care | Health IT (include EMR) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes |
|------------------------------|--|---|-------------------------|---|---|
| Nyamathi, 2006 (fair) | LTBI treatment = twice weekly doses of 900 mg INH 50mg vitamin B6 over 6 months at a common medical clinic, monthly monitoring of side effects . Note: unlike control group, NCMI participants were tracked when they missed a DOT dose. | Those requesting assistance with non-TB health care problems were referred to the medical clinic located on site. | NR | Standard of care included (received by both study groups) DOT at the research clinic twice a week over a period of 6 months administered by research nurses; a 10-min question and answer session regarding LTBI treatment before receiving the INH dose and time devoted to individualized needs, such as referral to treatments or services; a detailed directory of community resources and services of local agencies; \$5 for each dose of INH received; referral on request to the medical clinic located on site; Control participants: received a single 20-min factual presentation on TB and the importance of being compliant with the LTBI treatment. | NR |
| Hsieh, 2007 (fair) | yes (see coordination of services) | hospital-based program | NR | Control group: routine hospital care without any additional intervention and a clinic FU visit with a case manager once per month | at 2 months, statistically significant difference in sputum conversion (87% vs 75% vs 53%) and CXR improvement rates (62% vs 59% vs 32%); treatment success rates were significantly better in Group 1 than in the Group 2 or Control (94% vs 69% vs 69%); |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|------------------------------|---|--|----------------|--|---|--|---|
| Husbands, 2007 (Poor) | 1) Cost among the very depressed (CM vs usual care): \$17,901 vs. \$20,839 (p = .19) 2) Among females (CM vs. usual care): \$10,548 vs \$27,379 (p-value=NR) | NR | NR | 128 screened/ NR/ 99 enrolled | Attrition and loss to FU (not differentiated) 20; completed 6-month FU = 79 (80%) | NR | 91% had used this AIDS service organization before; Those who completed the study (n=79) had, on average at baseline, a clinically significant 8-10 point higher (better) QOL score than those who did not complete the study (n=20). Unable to tell from data reported how many were randomized to each group/attrition rates from each group. |
| McCoy, 1992 (poor) | NR | Number of services received (CM vs. control) 193 vs. 42 services Change in high risk behaviors: a) Number of different people with whom the study participant injected and had sex (fewer compared with baseline for CM/more compared with baseline for control); (p<0.01) | NR | Screened, eligible unclear; 100 enrolled in CM vs 40 enrolled in usual care (randomization suspended "to fill case loads" and then reinstituted; project expired before # in control group could be equalized) | NR | NR | |
| Nickel, 1996 (Poor) | NR | NR | NR | A total of 130 of the estimated 394 people with AIDS living in the catchment area (Columbus-Franklin County, Ohio) were referred for home care to one of the seven participating agencies at some time during the 2.5 years of the project. 45 were ineligible; 28 of the 85 eligible chose not to participate; 57 (67% of those eligible) enrolled (29 CM; 28 usual care) | NR/NR/57 | NR | Duration of involvement in the intervention protocols varied by individual, with such events as death (range: 5 to 815 days) |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|----------------------------------|--|--|----------------|--|---|--|--|
| Sorenson, 2003(Fair) | NSD were found in self-reporting of treatment services received. | NR | NR | 371 screened; 281 eligible; 190 (68% of eligible) enrolled; randomized to either brief contact (n = 98) or CM (n = 92); | A total of 160 participants (84% of total, 90% of living) were interviewed at 6 months, 150 (79% of total, 90% of living) at 12 months, and 151 (79% of total, 95% of living) at the 18-month follow-up. | NR | The study occurred at San Francisco General Hospital, a public teaching hospital. Study recruitment occurred 1994–1996. Participants recruited from: inpatient medical wards (44%), outpatient heroin detox clinic (25%), and emergency department (22%); no other unit accounted for more than 4% of participants. |
| Wohl, 2006; Sansom, 2008; (fair) | Study group vs. usual care: 1) IACM participants: 2.3 vs 6.7 days/1000 person–days; incidence rate ratio [IRR]: 0.34, 97.5% CI 0.13–0.87, p<0.025; 2) DAART participants: 44.2 vs. 31.5/1000 person–days, IRR: 1.4; 97.5% CI: 1.01–1.95) p<0.025. 3) Average participant health care utilization costs were \$13,127, \$8,988, and \$14,416 for DAART, IACM, and SOC, | At 6 months no missing dose: 1) 97% DAART arm 2) 92% IACM arm 3) 97% Usual care AL6 | NR | 2797 screened; 416 (15%) eligible; 166 (40%) declined to participate; 250 enrolled: DAART arm (82), IACM arm (84), SOC arm (84); | 78 percent (194/250) completed 6 months in the study, with equal rates of retention among the 3 arms: DAART 79% (65/82), IACM 80% (67/84), SOC 74% (62/84); All were included in analysis of health outcomes. | NR | Recruited from 3 public HIV clinics in Los Angeles County from November 2001 through March 2004; In addition to primary care services, the study clinics adherence support included provider adherence counseling at the time of clinic visits, meetings with a case manager every 3–4 months, and access to community-based social support services, including adherence support provided by community based pharmacies and others. |
| Nyamathi, 2006 (fair) | NR | 64% of NCM group completed LTBI treatment; 42% of control completed their LTBI treatment (OR 3.01 (CI 2.15-4.20); treatment completion was | | Screened 5442/ eligible 980 (PPD+); enrolled 520 (CM, n=278; control, n=242) | 5% overall lost to follow-up/follow-up data available for 494 | NR | |

| Author, Year (Quality Score) | Results by Resource Utilization Outcomes | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed (Overall) | Total withdrawals; withdrawals due to adverse events | Notes |
|---------------------------------------|---|---|-------------------|---|--|---|-------|
| | | significantly associated with the NCM intervention ($r = .22$, $p < .001$; TB knowledge: At baseline, the mean knowledge scores were 7.3 and 7.6 for standard care and NCM groups, respectively ($p > .05$). At follow-up, mean knowledge scores were 9.3 for standard care and 11.4 for NCM ($p < .001$). | | | | | |
| Hsieh, 2007 (fair) | NR | statistically significant adherence rate differences among the three groups for the third, fourth, fifth and sixth months ($< 80\%$ adherence(range for 3rd through 6th months)): Group 1 (0-0%), Group 2 (13-22%), Control (19-28%); treatment completion rates were significantly better in Group 1 than in the Group 2 or Control (97% vs 69% vs 69%) | NR | Screened: NR; eligible 114; enrolled 114; each group n=38 | 96 analyzed (32 in each group); (10 died, 8 not included because of the match procedure) | NR | |

Appendix O. Evidence Tables: Case Management for Other Clinical Conditions

| Author, Year (Quality Score) | Study Purpose AND/OR <i>A priori</i> hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Crossover); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES |
|------------------------------|---|---|---|---|--|
| Allen JK, 2002 | To test effectiveness of nurse CM program to lower blood lipids in patients with CHD. | Patients with hypercholesterolemia, defined as an LDL-C level >2.59 mmol/L (100 mg/dL) or a total cholesterol level >5.18 mmol/L (200 mg/dL), who underwent coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI). | Lived >75 miles from the hospital; had a severe, noncardiac life threatening illness; major psychiatric or substance abuse morbidity, or severe cardiac disease with a poor prognosis (NYHA Class IV or preoperative EF <30%); >75 years, BMI >40; participation in conflicting research study; unable to speak/understand English, physician caring for patient refused. | RCT, duration 1 year | Mean age: Intervention group 61.1, usual care 59.6 1) Gender: CM group (70% male/N=70, 30% female/N=34), Usual care (73% male/N=83, 27% female/N=30) 2) Race: CM group (81% white/N=93, 19% other/N=22) Usual care (82% white/N=93, 18% other/N=20) 3) Education: CM group 13.8+/-3.7 years, usual care 13.3 +/- 3.4 years |
| Chow and Wong, 2010 | To examine the effectiveness of a nurse-led case management program in improving the quality of life of peritoneal dialysis patients in Hong Kong. | Patients were included if: admitted to the renal units of the study hospitals, telephone access after discharge, receiving PD. | Patients were excluded if: Received PD only intermittently, transitioned to HD during hospitalization, had an upcoming planned admission, new to PD within 3 months. | RCT with pre and post test Study duration: 12 weeks | Age mean: 56.9 +/- 13.5 years Age range: 23-78 years 38.8% Female Race: NR 1) 14.3% and 7% had no formal education in the control and intervention groups respectively 2) 21.4% and 11.6% were unemployed in the control and intervention groups respectively 3) 35.8% and 30.3% had financial status that was insufficient or extremely insufficient in the control and CM groups respectively. |
| Claiborne, 2006 | Investigated efficacy of social work care coordination model for stroke patients; (evaluated cost via MD, ER, and inpatient reimbursements to "evaluate the ability of group membership (intervention or control) to affect reimbursement." | Patients surviving stroke and completing and inpatient rehab program; 18 or older. | Severe cognitive impairment, language comprehension problems, or discharged to long term care facility | Trial, randomly assigned pre-post experimental design, 3 months prior data collection, 3 month intervention. (6 months) | Age range: Intervention group: 70 Control Group: 65 11.99 ("averaged 65 to 70 years old"--mean age?); Gender (39% Female) Race and/or ethnicity (84% white) |

| Author, Year (Quality Score) | Primary disease of population 1) List specific comorbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience |
|---|--|--|--|--|---|
| Allen JK, 2002 | Adults with hypercholesterolemia and CHD who received CABG or PCI. 1) MI (53%/N=61 CM 54.9%/N=62 usual care); HTN (positive history, or BP >140/90 mm HG)(74.8% CM, 77% usual care); prior revascularization (23.5% CM group, 31% usual care group); CHF (4.4% CM group, 5.3% usual care); Cerebrovascular disease (5.2% CM group, 6.2% usual care); Peripheral vascular disease (10.4% CM group, 14.2% usual care); DM (28.7% CM group, 23% usual care); BMI (28.7 CM group, 28.2 usual care) 2) NR | Majority of population had multiple comorbidities and were considered "high-risk" CABG or PCI. No socioeconomic factors contributing to complex care described by authors. | NR. States that some patients received insurance coverage for prescriptions and others paid out of pocket. | NR | NP |
| Chow and Wong, 2010 | ESRD Etiology unknown on 57.6%, DM in 24.7%, DM in 10.6%; mean years on PD: 2.6; range years on PD: 0.3-12 1) 41% had diabetes(38.1% and 44.2% in the control and intervention groups respectively); 32.9% had heart disease (28.6% and 37.2% in the control and intervention groups respectively) 2) 1.2% had psychiatric disease (OF NOTE, 0% in control group and 2.3% in the intervention group) | 16.5% unemployed, 7% with "extremely insufficient" financial status; 10.6% with no formal education | Non-US | Non-US | All care managers are referred to as "nurses" (no specific educational background info provided) |
| Claiborne, 2006 | Stroke (CVD) 1) Patient's with moderate, intermediate and high complexity (details NR) 2) Reports trauma and mental health issues | Psychosocial assessment consists of five sections and a total score. A higher score indicates that the patient is experiencing greater stressors. The five sections are (a) family issues and support, with scores ranging from 9 - 45; (b) social issues ranging from 7 to 35; (c) trauma and mental health issues ranging from 6 to 30; (d) legal issues ranging from 2 to 10; and (e) chemical dependency issues ranging from 4 to 20. Total scores range from 28 to 140. | Medicare, Medicaid | Yes, organizations not named. | Care coordinators were master's-level social workers |

| Author, Year (Quality Score) | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls |
|---|--|--|--|--|-----------------|---|
| Allen JK, 2002 | NP and PCP and/or cardiologist participated in a partnership to manage patient's lipids. NP provided 1 outpatient visit 4 to 6 weeks after discharge to initiate a plan for lipid management. Plan included counseling for lifestyle modifications and prescription or adjustment of appropriate lipid lowering medications. Follow-up telephone calls to the patient reinforced counseling and recommended appropriate adjustments in medications based on results of blood tests. | NR | Primary care clinic | 1 outpatient visit 4 to 6 weeks after discharge to initiate management plan. Follow-up telephone calls to reinforce counseling and recommend medication adjustments. | NR | NR. 1 outpatient visit 4-6 weeks after discharge to initiate plan. Average of 7 contacts per patient over 1 year. |
| Chow and Wong, 2010 | 1) Discharge (DC) planning 2) Weekly nurse phone follow-up after discharge for 6 weeks DC planning included: discussion with patient and family and OMAHA evaluation of patient's physical, social, cognitive, emotional status, individualized education program, development of shared objectives. | 24 hrs training required for each NCM. All required to complete training with a simulated patient. | Not explicitly stated, but probably a call center. | Telephone | NR | 1) Weekly phone follow-up for 6 weeks starting 72 hrs post discharge 2) Face to face interviews at discharge, 6 weeks post discharge, and 12 weeks post discharge. |
| Claiborne, 2006 | A social worker made an initial home visit within 1 to 2 weeks after the patient was discharged from an inpatient stroke program at a physical rehabilitation hospital. Depending on patient need, subsequent contacts with the patient were made via telephone or home visits. Most patients received one home visit and weekly telephone appointments ranging from 20 minutes to 1 hour. Home visits were rare after the initial visit. A few patients received two home visits. One patient with aphasia required weekly home visits. | NR | Physical rehabilitation hospital | 1 home visit; weekly telephone appointments. | NR | Most patients received one home visit and weekly telephone appointments; telephone appointments ranging from 20 minutes to 1 hour. |

| Author, Year (Quality Score) | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self-Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment |
|-------------------------------------|---|---|---|---|--|--|
| Allen JK, 2002 | Single outpatient baseline follow-up visit for 1 hour in clinic. | Nurse practitioner and primary provider and/or cardiologist participated in a partnership for managing the patient's lipids. 1 outpatient visit 4 to 6 weeks after discharge to initiate lipid management plan that included counseling for lifestyle modifications and prescription or adjustment of appropriate lipid lowering medications. Follow-up telephone calls to the patient reinforced counseling and recommended appropriate adjustments in medications on the basis of the results of follow-up blood tests. | All patients received standard discharge teaching and physical therapy instructions administered by the hospital. Instructions included general guidelines for activity, monitoring pulse, temperature, and diet, and personalized exercise instructions for the first few weeks after discharge. | Follow-up telephone calls to the patient reinforced counseling. | Standard discharge care for all patients. | Repeat measures of plasma lipids and liver function tests at 6 weeks after initiation or dosage adjustment; When the serum concentration of LDLC was >2.20 mmol/L (85 mg/dL), the nurse practitioner initiated or adjusted drug therapy with the use of lipid management algorithms. |
| Chow and Wong, 2010 | 3 interviews; time utilized for each interview not specified. Location: unclear (presumably a clinic) | Planning: as stated, included discharge planning (outlined previously); during follow-up calls, the nurse checked and reinforced patient's progress towards meeting shared objectives and identified new or potential complications including any problems encountered on returning home. | Individualized education plan developed for each patient by nurse care manager at time of discharge. | Patient goal-setting, as described | During follow-up calls, additional services could be utilized if felt necessary by nurse care manager. Those additional services included: community nurse home visit, referral to renal nurse clinics or wards, referral to renal doctor's clinic, medical treatment, referral to ER for emergent treatment | NR; Unclear. Nurse had ability to refer patient to renal nurse evaluation or MD evaluation or ER. Nurse also had an option for "medical treatment" but that is not described. |
| Claiborne, 2006 | Face time: 1 in home visit at pts home; Home visits were rare after the initial visit. A few patients received two home visits. One patient with aphasia required weekly home visits. | Intervention group follow-up data were collected by the social worker during the last care coordination appointment at the end of 3 months. | NR | NR | Provided service needs assessment, service coordination, assisting, and advocating for services (e.g., new medical appointments, additional care, transportation issues, financial issues, housing, heating and repair assistance). | "Monitoring patient care and progress;" no, did not adjust medications. |

| Author, Year (Quality Score) | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes |
|------------------------------|--|-------------------------|----------------------------|---|--|---|
| Allen JK, 2002 | Care plans, results of lipid testing, and adjustments of medications communicated to the primary provider and/or cardiologist regularly by letter. | NR | None | Patients in usual care group observed by usual primary providers and/or cardiologists. Enhanced usual care included written results of full lipid profiles sent to patients and their physicians at 4 wks, 6 and 12 months post-discharge; received recommendations about goal levels for lipoproteins and general recommendations for diet and physical activity at baseline and again at the time of followup examinations. Note: All patients received standard discharge teaching and physical therapy instructions by the hospital and include: general guidelines for activity, monitoring pulse, temperature, and diet, and personalized exercise instructions for the first few weeks after discharge. | After 1 year of CM the average TC, LDL-C, and TG levels were significantly lower in intervention group. 1) Mean HDL-C level increased modestly in both groups. Significantly more patients in CM group than usual care group achieved LDL-C levels <2.59 mmol/L (65% vs 35%, p=.0001). 2) NSD in proportion of patients achieving these goals at baseline. At 1 year, 87% of patients in intervention group and 79% of patients in usual care group were on lipid-lowering drugs. 97% in both groups were taking a single statin. 3) NS changes in BMI in either group. | NR |
| Chow and Wong, 2010 | Not reported. NCM did have ability to refer patient to nephrologist office or ER - but primary care not explicitly stated. | NR | None | Usual care included routine discharge care: standard information, telephone hotline service, self-help materials. | 1) NSD between control and study group overall for all quality of life measures. 2) Statistically significant ($P<0.05$) interaction effects were noted for sleep, staff encouragement, patient satisfaction, and social function. 3) By three time intervals, participants in the intervention group showed greater improvement in their scores during the first 6 weeks after intervention. Participants in the control group displayed slight improvement during first 12 weeks, but to a lesser degree than in intervention group. | NA |
| Claiborne, 2006 | Possibly; "providing brief patient/ caregiver counseling." | No | None | "Both groups received subsequent treatment as determined by physicians and patients." However, the intervention patients received additional social work care coordination services that the control group did not. | NR | "Outpatient reimbursement higher for Intervention group ($p<.05$), ER reimbursement lower for intervention group ($p<.05$); Total reimbursement lower for intervention group ($P<.05$)" |

| Author, Year (Quality Score) | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed | Total withdrawals; withdrawals due to adverse events |
|---|---|-----------------------|---|--|---|
| Allen JK, 2002 | Compared with usual care group, patients in CM group reported a greater reduction in dietary consumption of calories from total fat ($P = .0004$), saturated fat ($P = .0004$), and cholesterol ($P = .02$) and increase in dietary fiber ($P = .13$). Significantly higher proportion of patients in the intervention group (40%) reported exercising at a level of 6 MET hours per week compared with patients in the usual care group (26%, $P = .02$). | NR | Of the 337 patients eligible, 228 (68%) consented/115 randomized to intervention group and 113 to usual care group. 158 (69%) completed 12 month follow-up (77% of intervention patients and 62% of usual care patients). | Loss to follow-up: inconvenience or loss of interest (58); changed providers (4); unable to contact (3); death (3); moved (2). | NR |
| Chow and Wong, 2010 | NA | NR | Number screened: NR/Number eligible: 120/ Number enrolled: 100 | Lost to follow-up: 9 (4 in intervention group and 5 in control group) Withdrawn, unclear. A total of 6 were listed as having "discontinued intervention" due to death, transplant, or change of treatment regimen (3 in each group). Analyzed: 85 (43 in intervention group and 42 in control group). Note, 45 in each group required to meet sample size calculations. | Total withdrawals unclear (see previous). Adverse events NR. |
| Claiborne, 2006 | NR | NR | 28 patients participated; 16 were assigned to the intervention group and 12 were assigned to the control | Report 28 analyzed. Four control-group patients were removed from the study due to 2 dying, 1 entering a skilled nursing facility after a rehospitalization event, and 1 left the study; One patient from the intervention group voluntarily left the study | Unclear; one patient from the CM group left the study. |

| Author, Year (Quality Score) | Study Purpose AND/OR A priori hypothesis (if stated) | Eligibility Criteria | Exclusion Criteria | Study Design/Type (RCT, Crossover); Duration of intervention | Demographics: Age (Mean, Median and Range) Gender (% Female) Race and/or ethnicity SES |
|------------------------------|---|---|---|--|---|
| Ma, 2009 | To evaluate a nurse- and dietitian-led CM program for reducing major CVD risk factors in low-income, primarily ethnic minority patients in a county health care system, 63.0% of whom had T2DM. | Men and women aged 35 to 85 years who had moderately to severely elevated levels of major modifiable CVD risk factors with or without a history of atherosclerotic CVD or DM. | No elevated CVD risk, leaving area, difficulty coming to visits Enrolled in another study Age < 35 or > 85 years Serious comorbidities, family member already enrolled, language . | 2-arm RCT | Mean age (55.1 overall, 54.4 CM group, 55.8 usual care) Female (65.6% overall, 64.6% CM group, 66.7% usual care) Hispanic (63% overall, 63.2% CM group, 62.8% usual care) African American (9.6% overall, 9.9% CM group, 9.2% usual care) Asian (11.9% overall, 11.3% CM group, 12.6% usual care) Education less than 8th grade (44.9% overall, 50.7% CM group, 39% usual care); Unemployed, disabled, retired (60.5% overall, 63.2% CM group, 57.7% usual care); Unable to speak, read or understand English (49.1% overall, 50.5% CM group, 48.1% usual care). |
| Sadowski 2009 | To assess the effectiveness of a case management and housing program in reducing use of urgent medical services among homeless adults with chronic medical illnesses. | Patients \geq 18 years without stable housing 30 days prior to hospitalization, referred at least 24 hours before hospital discharge and not the guardian of minor children needing housing. Also had \geq 1 chronic medical illnesses confirmed in medical record: HTN or diabetes requiring medication; thromboembolic disease; renal failure or cirrhosis; CHF, MI atrial or ventricular arrhythmias; seizures in past year or needed medication for control; asthma or emphysema with \geq 1 ED visit or hospitalization in past 3 years; cancer; HIV; GI bleeding (not peptic ulcer disease) or chronic pancreatitis | Hospital physician determined them incapable of self-care on hospital discharge. | RCT | Mean Age: 47 years 22% Female 95% did not graduate from HS |

| Author, Year (Quality Score) | Primary disease of population 1) List specific comorbidities 2) Coexisting mental illness (If yes, include)? | Describe factors of complex care needs (e.g., homeless, number of comorbidities, poor, uninsured) | Payer/Insurance Carrier (e.g., Medicare, Medicaid, private) | Managed Care (Yes/No); if yes, name organization or describe. | Characteristics of the case manager: discipline, layworker, peer educator, degree, years of experience |
|---|---|--|--|--|---|
| Ma, 2009 | <p>Patients at elevated risk for cardiovascular disease.</p> <p>1) Hyperlipidemia/ hypercholesterolemia (Overall 63%, CM group 64.2%, usual care 61.8%); Metabolic Syndrome (overall 59.2%, CM group 59.0%, 59.4% usual care); Elevated BMI (overall men 33, women 35.4, men in CM 33.1, men in usual care 32.9, women in CM group 35.2, women in usual care 35.5)</p> <p>2) NR</p> | Sizable low income population, most of whom have Medicaid or a county sponsored indigent care plan. | Most Medicaid or a county sponsored indigent care plan. | No | Nurse and dietitian. |
| Sadowski 2009 | <p>≥1 Chronic medical illness (see eligibility criteria cell)</p> <p>1) Unclear</p> <p>2) 43% with major depression; 17% with panic disorder</p> | Median duration of homelessness= 30 mon 55% without medical insurance | Of the 55% insured, 37% Medicaid, 8% Medicare | No | Case managers social worker with master's-level training. |

| Author, Year (Quality Score) | Describe case management intervention | Describe pre- intervention training include: scope, frequency, duration | Primary Location of Case Manager | Primary mode of case manager contact with patient (clinic visit, telephone) | Caseload | Frequency of visits and phone calls |
|---|--|--|---|--|--|--|
| Ma, 2009 | CM participants received a 1:1 nurse- and dietitian-led CM intervention. HTH program differed by focusing on high-risk patients served by public health primary care clinics. Principal CM strategies included (1) intensive, individualized care; (2) continuity of care and coordination with primary and specialty care; (3) self-management support; (4) implementation of evidence-based treatment guidelines for primary and secondary CVD prevention ^{15,16} ; and (5) behavioral counseling to improve physical activity, nutrition, weight management, stress reduction, and medication adherence. | Nurse and dietitian CM were trained and supervised by a senior nurse practitioner and the principal investigator. | Clinic | Face: Face | | |
| Sadowski 2009 | Case management was one of three integrated components of intervention (after hospital discharge transitional housing at respite care centers, placement in stable housing, and case management). Functions of CM included: hospital CM facilitated discharge planning during hospitalizations and placement in respite care or back in stable housing sites; respite and housing CM facilitated the participant's housing placement and coordinated appropriate medical care with substance abuse and mental health treatment referrals as needed. On-site CM had contact with participant at least biweekly. | Intervention designed by developed by a consortium of 14 hospitals, respite care centers, and housing agencies in Chicago. Note: no description of duration. | Hospital, respite location and study sites. | Appointments and follow-up phone calls. | No more than 20 subjects per case manager. | At least bi-weekly. |

| Author, Year (Quality Score) | Face: Face Time Location of face: face time (e.g., in clinic, home) | Planning and Assessment | Patient Education (e.g., seminar) | Self- Management Support [e.g., motivational interviews, coaching, pt goal setting] | Coordination of Services (e.g., medical, social services, financial services) | Medical Monitoring; Adjustment |
|---|---|---|--|--|--|---|
| Sadowski 2009 | NR | Yes, assessed medical, mental health and substance abuse needs. | No | No | Yes, housing services | No; No |

| Author, Year (Quality Score) | Integrated within primary care | Health IT (include EMR) | Others (list and describe) | Describe comparator (e.g., usual care) | Results by Patient Health Outcomes | Results by Resource Utilization Outcomes |
|---|---|------------------------------------|--|---|---|---|
| Sadowski 2009 | No | No | Intervention case managers had weekly team meetings to coordinate the housing, social service, and medical care needs of participants. | Participants in usual care group referred back to the original hospital social worker and received the usual discharge planning services with no continued relationship after hospital discharge. Typically patients provided with transportation to an overnight shelter if no other accommodation could be arranged before discharge. Participants with HIV had access to case management after hospital discharge through a Ryan White program while those without HIV had access to general case management services. | NA | Rate Reduction in intervention vs. usual care: (95% CI) Hospitalizations 29 (10 to 44) p=.005 Hospital days 29 (8 to 45) .01 Emergency department visits 24 (3 to 40) For every 100 homeless adults offered the intervention, the expected benefits over the next year include: 1) 49 (95% CI, -20 to 119) fewer hospitalizations; 2) 270 (95% CI, -23 to 563), fewer hospital days; 3) 116 (95% CI, -3 to 235) fewer emergency department visits. |

| Author, Year (Quality Score) | Results by Process Measure Outcomes | Harms reported | Number screened/ eligible/enrolled | Number withdrawn/ lost to fu/ analyzed | Total withdrawals; withdrawals due to adverse events |
|---|--|------------------------------------|---|---|---|
| Sadowski 2009 | NA | Death (no other harms reported) | 604/455/407 | 76/61/405 | 76/0 |

Appendix P. Strength of Evidence

Table P-1. Strength of Evidence for Key Outcomes in Case Management for Older Adults with Multiple Chronic Diseases

| Outcome, Number of studies | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|---------------------|--|----------------------|
| | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Mortality 7 studies | Low | Consistent | Direct | Precise | 35,641 | Case management programs that serve patients with multiple chronic diseases do not reduce overall mortality. | High |
| Functional outcomes 3 trials | Low | Consistent | Direct | Precise | 27,884 | Case management programs that serve patients with multiple chronic diseases do not result in clinically important improvements in functional status. | High |
| Patient's perception (ratings) of care coordination 2 trials | Low | Inconsistent | Direct | Precise | 17,205 | Case management programs that serve patients with multiple chronic diseases increase patients' perceptions of the coordination of their care. | High |
| Hospitalizations 9 studies | Low | Inconsistent | Direct | Precise | 33,484 | Case management programs that serve patients with multiple chronic diseases do not reduce overall rates of hospitalization. | Moderate |
| ED visits 4 studies | Medium | Inconsistent | Direct | Imprecise | 4593 | Evidence either is unavailable or does not permit a conclusion. | Insufficient |

| Outcome, Number of studies | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|---------------------|--|----------------------|
| | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Medicare expenditures 3 trials | Low | Consistent | Direct | Imprecise | 27,884 | Case management programs that serve patients with multiple chronic diseases do not reduce Medicare expenditures. | High |
| Patient characteristics 2 studies | Medium | Consistent | Direct | Imprecise | 19,733 | Case management is more effective for reducing hospitalization rates among patients with greater disease burden. | Low |
| Intervention characteristics 3 trials | Low | Consistent | Direct | Imprecise | 27,884 | Case management is more effective for preventing hospitalizations when case managers have greater personal contact with patients and physicians. | Moderate |

Table P-2. Strength of Evidence for Key Outcomes in Case Management for the Frail Elderly

| | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|----------------------------|---|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Mortality 4 studies | Medium | Consistent | Direct | Precise | 1,546 | CM does not affect mortality in frail elders. | Moderate |
| Functional outcomes 7 studies | Medium | Inconsistent | Direct | Imprecise | 2,772 | Evidence is insufficient to assess the effect CM on functional status in the frail elderly. | Insufficient |
| Hospitalizations 6 studies | Medium | Inconsistent | Direct | Precise | 2309 | CM does not decrease acute hospitalizations in the frail elderly. | Low |
| Emergency department visits 3 trials | Medium | Inconsistent | Direct | Imprecise | 943 | | Insufficient |
| Outpatient services 3 trials | Medium | Inconsistent | Direct | Imprecise | 1201 | | Insufficient |

Table P-3. Strength of Evidence for Key Outcomes in Case Management for Patients with Dementia

| Outcome, Number of studies | Quality assessment | | | | Summary of findings | | |
|--|--|--|---------------------------------------|--|------------------------|--|-------------------------|
| | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Nursing home placement rates 8 studies | Medium | Inconsistent | Direct | Precise | 9250 | No delay in NH placement at 24 months | Moderate |
| Caregiver burden 7 studies | Medium | Consistent | Direct | Precise | 9309 | Reduction in CG burden at 12 months | Moderate |
| Caregiver depression 4 studies | Low | Inconsistent | Direct | Precise | 8801 | Reduction of CG depression at 2 years | Moderate |
| Behavioral symptoms 5 studies | Medium | Inconsistent | Direct | Precise | 817 | No change in symptoms at 12 mo. | Moderate |
| Guideline adherence 1 study | Medium | Consistent | Direct | Imprecise | 408 | Case management programs that focus on clinical guideline measures for care of dementia increase adherence to those measures | Low |
| Hospitalizations/ ED visits 3 studies | High | Inconsistent | Direct | Imprecise | 451 | No change in hospitalization rates at 12 mo. | Low |
| Healthcare expenditures 4 studies | Low | Consistent | Direct | Imprecise | 8,453 | Case management does not reduce healthcare expenditures for patients with dementia. | Moderate |
| Intervention characteristics 1 trial | Medium | Consistent | Direct | Imprecise | 406 | Case management programs that serve patients with dementia who have in-home spouse caregivers and continue services for longer than two years are more effective for delaying nursing home placement than programs providing services for 2 years or less. | Low |

Table P-4. Strength of Evidence for Key Outcomes in Case Management for Patients with Congestive Heart Failure (CHF)

| | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|----------------------------|---|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Mortality 5 studies | Low | Consistent | Direct | Imprecise | 2351 | Case management programs that serve adults with CHF do not reduce mortality. | Low |
| Quality of life 5 studies | Low | Inconsistent | Direct | Imprecise | 2351 | Case management programs that serve patients with CHF improve CHF-related quality of life. | Low |
| Patient satisfaction 3 studies | Medium | Consistent | Direct | Imprecise | 2351 | Case management programs that serve patients with CHF increase patient satisfaction. | Moderate |
| Patient adherence to self-management behaviors 3 studies | Low | Consistent | Direct | Imprecise | 844 | Case management increases patients' adherence to self-management behaviors recommended for patients with CHF. | Moderate |
| All-cause hospitalizations 9 studies | Low | Inconsistent | Direct | Imprecise | 3476 | Case management reduces readmission rates among hospitalized CHF patients at high risk for readmission. | Low |

Table P-5. Strength of Evidence for Key Outcomes in Case Management for Patients with Diabetes

| Outcome, Number of studies | Quality assessment | | | | Summary of findings | | |
|---|--|--|---------------------------------------|--|------------------------|---|-------------------------|
| | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Mortality 1 study | High | Unknown (single study) | Direct | Precise | 1,665 | No mortality benefit identified. | Low |
| Quality of life 2 studies | High | Inconsistent | Indirect | Imprecise | 465 | No quality of life benefit identified. | Low |
| Improvement in HgA1c 10 studies | Low | Inconsistent | Indirect | Precise | 12,536 | No clear benefit identified. | Moderate |
| Improvement in systolic blood pressure 5 studies | Medium | Inconsistent | Indirect | Precise | 3,001 | No clear benefit identified. | Moderate |
| Improvement in diastolic blood pressure 5 studies | Medium | Inconsistent | Indirect | Precise | 3,001 | No clear benefit identified. | Moderate |
| Improvement in LDL cholesterol 7 studies | Low | Inconsistent | Indirect | Precise | 8,793 | No clear benefit identified. | Moderate |
| Improvement in HDL | Medium | Consistent | Indirect | Precise | 1,237 | No benefit identified. | Moderate |

| | Quality assessment | | | | Summary of findings | | |
|--|---------------------------------------|---|------------------------------------|-------------------------------------|---------------------|---|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| cholesterol 4 studies | | | | | | | |
| Improvement in total cholesterol 3 studies | Medium | Consistent | Indirect | Precise | 1,051 | No benefit identified. | Moderate |
| Improvement in triglycerides 3 studies | Medium | Inconsistent | Indirect | Imprecise | 695 | No clear benefit identified. | Moderate |
| Improvement in BMI/weight 5 studies | Medium | Inconsistent | Indirect | Precise | 1,555 | No clear benefit identified. | Moderate |
| Fruit and vegetable intake 1 study | High | Unknown (single study) | Indirect | Imprecise | 318 | 1 of 1 study found that fruit and vegetable intake improved in CM group (p<0.05) | Low |
| Exercise frequency 1 study | High | Unknown (single study) | Indirect | Imprecise | 318 | No benefit identified. | Low |
| Physical activity index 1 study | High | Unknown (single study) | Indirect | Imprecise | 186 | No benefit identified. | Low |
| Dietary Score 1 study | High | Unknown (single study) | Indirect | Imprecise | 186 | No benefit identified. | Low |
| Development of retinopathy 1 study | High | Unknown (single study) | Indirect | Imprecise | 362 | CM improved risk of diabetic retinopathy in 1 of 1 study; usual care experience increased risk compared to CM (OR 5.35, p=0.034). | Low |
| Patient satisfaction 1 study | High | Unknown (single study) | Indirect | Imprecise | 246 | CM improved patient satisfaction in 1 of 1 study (p = 0.04). | Low |

| | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|---------------------|--|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Eye examinations 2 studies | High | Inconsistent | Indirect | Precise | 1,316 | No clear benefit identified. | Low |
| Medication adherence 1 study | High | Unknown (single study) | Indirect | Imprecise | 318 | CM improved medication adherence in 1 of 1 study (p<0.05). | Low |
| Dietary instruction from dietitian 1 study | High | Unknown (single study) | Indirect | Precise | 1,070 | CM improved dietitian intervention frequency in 1 of 1 study (p=0.0001) | Low |
| Self-monitoring glucose 1 study | High | Unknown (single study) | Indirect | Precise | 1,070 | CM improved glucose self-monitoring frequency in 1 of 1 study (p=0.0001) | Low |
| Dental examination 1 study | High | Unknown (single study) | Indirect | Precise | 1,070 | CM improved dental examination frequency in 1 of 1 study (p=0.0002). | Low |
| Foot examination 1 study | High | Unknown (single study) | Indirect | Precise | 1,070 | CM improved foot examination frequency in 1 of 1 study (p=0.005). | Low |
| Nephropathy screening 1 study | High | Unknown (single study) | Indirect | Precise | 1,070 | CM improved nephropathy screening frequency in 1 of 1 study (p=0.002). | Low |
| Receive aspirin therapy 2 studies | High | Inconsistent | Indirect | Precise | 1,316 | No clear benefit. | Low |

| | Quality assessment | | | | Summary of findings | | |
|---|------------------------------------|--|---------------------------------|----------------------------------|----------------------------|--|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Receive lipid-lowering therapy 2 studies | High | Consistent | Indirect | Precise | 1,316 | No benefit identified. | Low |
| Receive renin angiotensin system blockade therapy 1 study | High | Unknown (single study) | Indirect | Precise | 1,070 | No benefit identified in 1 of 1 study. | Low |
| Emergency department visits 2 studies | High | Inconsistent | Direct | Precise | 860 | No clear benefit identified. | Low |
| Hospitalizations 2 studies | High | Consistent | Direct | Imprecise | 788 | No benefit identified. | Low |
| Primary care provider visits 1 study | High | Unknown (single study) | Direct | Imprecise | 246 | No benefit identified. | Low |
| Mean healthcare cost 1 study | High | Unknown (single study) | Direct | Imprecise | 147 | 1 study found that CM resulted in decreased mean healthcare costs during the 12 month study duration as compared to usual care (p<0.05). | Low |
| Mean cost of pharmaceuticals 1 study | High | Unknown (single study) | Direct | Imprecise | 147 | No benefit of CM to reduce mean pharmaceutical cost in 1 of 1 study. | Low |
| Health outcomes within specific patient populations: | Medium | Inconsistent | Indirect | Precise | 1,555 | No clear benefit. | Low |

| | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|---------------------|------------------------|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| <i>Type II Diabetics</i> Improvement in HgA1c 5 studies | | | | | | | |
| Health outcomes within specific patient populations: <i>Type II Diabetics</i> Reduction of BMI 2 studies | Medium | Consistent | Indirect | Precise | 680 | No benefit identified. | Low |
| Health outcomes within specific patient populations: <i>Urban, Inner-city</i> Reduction in BMI 2 studies | High | Consistent | Indirect | Imprecise | 504 | No benefit identified. | Low |
| Health outcomes within specific patient populations: <i>African-Americans with type II diabetes</i> Reduction in HgA1c 2 studies | High | Consistent | Indirect | Imprecise | 728 | No benefit identified. | Low |
| Health outcomes within specific patient populations: <i>African-Americans with type II diabetes</i> Improvement in systolic blood pressure 2 studies | High | Consistent | Indirect | Imprecise | 728 | No benefit identified. | Low |
| Health outcomes within specific patient populations: <i>African-Americans with type II diabetes</i> | High | Consistent | Indirect | Imprecise | 728 | No benefit identified. | Low |

| | Quality assessment | | | | Summary of findings | | |
|--|------------------------------------|--|---------------------------------|----------------------------------|---------------------|------------------------------|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Improvement in HDL cholesterol 2 studies | | | | | | | |
| Health outcomes within specific patient populations: <i>African-Americans with type II diabetes</i> Reduction in BMI 2 studies | High | Consistent | Indirect | Imprecise | 728 | No benefit identified. | Low |
| Health outcomes within specific patient populations: <i>American Indian/Alaskan natives</i> Reduction in HgA1c 2 studies | Medium | Inconsistent | Indirect | Precise | 3,415 | No clear benefit identified. | Low |
| Health outcomes within specific patient populations: <i>Type II Diabetics</i> Reduction of BMI 2 studies | Medium | Consistent | Indirect | Precise | 680 | No benefit identified. | Low |

Table P-6. Strength of Evidence for Key Outcomes in Case Management for Patients with Cancer

| Quality assessment | | | | | Summary of findings | | |
|---|------------------------------------|--|---------------------------------|----------------------------------|----------------------------|--|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Cancer-related symptoms 4 studies | Medium | Inconsistent | Direct | Imprecise | 921 | Case management improves selected cancer-related symptoms and functioning (physical, psychosocial, and emotional). | Low |
| Quality of life 4 studies | Medium | Inconsistent | Direct | Imprecise | 921 | Case management does not improve overall quality of life or survival. | Low |
| Patient satisfaction with care 4 studies | Medium | Consistent | Direct | Imprecise | 921 | Case management programs that serve patients with cancer improve satisfaction with care. | Moderate |
| Patient receipt of appropriate treatment 3 studies | Medium | Consistent | Direct | Imprecise | 813 | Case management programs that serve patients with cancer increase the receipt of appropriate (i.e., guideline-recommended) cancer treatment. | Moderate |
| Overall cost and health care utilization 5 studies | Medium | Inconsistent | Direct | Imprecise | 1071 | Case management programs that serve patients with cancer have little effect on overall healthcare utilization and cost of care. | Low |

Table P-7. Strength of Evidence for Key Outcomes in Case Management for Patients with Serious Chronic Infections

| | Quality assessment | | | | Summary of findings | | |
|---|------------------------------------|--|---------------------------------|----------------------------------|---------------------|---|----------------------|
| Outcome, Number of studies | Risk of Bias (High, Medium or Low) | Consistency (Consistent or Inconsistent) | Directness (Direct or indirect) | Precision (Precise or imprecise) | Number of subjects | Magnitude of effect | Strength of Evidence |
| Mortality 2 trials | High | Consistent | Direct | Imprecise | 247 | CM does not improve survival among patients with HIV infection | Low |
| TB treatment 4 studies | Medium | Consistent | Direct | Precise | 1,346 | Short-term CM management programs that emphasize medication adherence improve rates of successful treatment for TB in vulnerable populations. | Moderate |
| HIV treatment 2 studies | Medium | Inconsistent | Direct | Imprecise | 500 | Evidence is insufficient to determine whether CM improves antiviral treatment of HIV infection. | Insufficient |
| Intervention characteristics 2 studies | Medium | Consistent | Direct | Imprecise | 364 | More frequent visits by a case manager are associated with higher rates of clinical improvement in HIV and TB infections. | Low |